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DEVELOPING A FRAMEWORK THEORY FOR ASSESSING THE BENEFITS OF CAREERS GUIDANCE

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ABSTRACT

Public expenditure decisions increasingly require demonstratable benefits from each area of expenditure. At the same time, investment in human capital represents a form of investment in which individuals typically bear considerable specific, as well as systematic, risks regarding future returns on their investment. This paper develops a framework in which the social benefits of increased expenditure on careers guidance can be assessed using the tools of economic analysis and decision theory. After examining these benefits from the viewpoint of risk management, the paper examines the quality of life measurement issues which are raised by career choice. It concludes with an examination of the wider social and macroeconomic benefits from improved labour market flexibility that investment in careers guidance may achieve.

1. INTRODUCTION

Education and training for post-16 year olds represent a major item of public expenditure. The budget of the new Learning and Skills Council (LSC), that is responsible for all post-16 education and training, excluding higher education, itself totals £7.315 billion for 2002-2003, including £1.355 billion for Sixth Form funding. Careers guidance to assist individuals in making improved career choices can play a significant role in helping to ensure that good use is made of the expenditure on education and training, and of the nation's resultant skills base.

There are several reasons why it is becoming increasingly desirable to be able to assess and optimise the benefits of expenditure on careers guidance:

a. careers guidance competes with many other forms of public expenditure, such as that on the National Health Service, for the finite total funds which the Chancellor of the Exchequer decides periodically to make available in each Comprehensive Spending Review. An inability to demonstrate quantifiable levels of benefits from the substantial current levels of expenditure on it will leave careers guidance in a weaker competitive position for continuing to secure this level of public funding. A failure to organise well the case for adequate funding for careers guidance is likely to result in inadequate levels of service provision, and a failure to reap the potential benefits which well-funded careers guidance could achieve. If higher levels of public expenditure on careers guidance are to be justified, an ability to demonstrate and, as far as possible, quantify the additional benefits which such additional expenditure can achieve becomes an even stronger requirement in the competition for public funding.

b. Each Comprehensive Spending Review is now accompanied by Public Service Agreements, and more detailed Service Delivery Agreements, between individual Government Departments, such as the Department for Education and Skills (DfES), and HM Treasury. These specify quantitative targets for service achievements which each main area of public expenditure is expected to deliver in return for the public funding provided. Being able to clearly identify service achievements in quantitative terms becomes a key part of this process. There is a strong case for seeking to ensure that the agreed targets for service achievements align well with the underlying objectives that careers guidance can help achieve. If these are to be realistic targets, they should also reflect the ability of careers guidance providers to deliver the intended levels of achievement for the proposed level of public funding. Being able to assess the magnitude, and relative importance, of the different quantitative deliverables which careers guidance might achieve in return for different levels of public funding is a key task in the development of evidence-based policy. The 2002 Comprehensive Spending Review is itself placing increased emphasis on the development of the evidence base for policy-making (HM Treasury, 2002), in line with the earlier *Modernising Government* White Paper (Cabinet Office, 1999). This task would be assisted by greater knowledge of the quantitative benefits that careers guidance can achieve in each relevant direction in return for different levels of public funding.

c. There is a need to ensure efficiency and effectiveness in resource allocation, from any given total level of public funding for careers guidance services through the national agency of the Learning and Skills Council, down to the local devolved agencies of the local LSCs. Each local agency will typically face varying local socio-economic circumstances for its intended careers guidance recipients. These varying circumstances are likely to impact upon the costs and the benefits associated with different levels of careers guidance provision in the localities concerned. Being able to assess these respective costs and benefits can assist in ensuring that efficiency and effectiveness are achieved in how the available national funds are distributed across different localities.

d. Each individual local LSC, in conjunction with its local careers guidance providers, will need to decide on how best to allocate its devolved budget across different possible forms of service provision. Being able to assess both the costs and the benefits of different levels of careers guidance for different target groups can assist in the development of resource management policies that can ensure that the total available local funds are deployed in the most efficient and effective ways.

e. Issues of the appropriate levels of service quality which individual careers guidance providers should achieve are relevant to the process of accreditation of these providers. Knowledge of the benefits which different levels of service quality can achieve compared to their cost could assist in the setting of target levels of service quality which individual service providers should achieve.

f. Achieving best value in the use of public funds is a statutory requirement for local authorities in England under the Local Government Act 1999 (see DETR, 1998). Being able to assess and quantify these benefits at the local level is likely to become an increasingly requirement within the best value regime. This in turn requires the development of appropriate quantitative performance indicators of local service achievements. If the quantitative indicators are poorly designed, they may not align well with the underlying objectives of careers guidance and the potential benefits which guidance can achieve. There is then a risk that the indicators will create perverse incentives for local managers simply to manage the indicators, rather than maximise the benefits of their guidance provision. Well-designed quantitative performance indicators therefore need to be closely aligned to the benefits which good careers guidance can achieve for its recipients (see Mayston, 1985, 2000a).

There are thus many ways in which an assessment of the benefits of careers guidance can play an important role in policy making and resource management. There is a strong case for ensuring that the response to each of the above pressures for the development of performance and outcome measures is a well-coordinated system that helps to maximise the benefits that are achieved from the resources deployed in careers guidance. Information and performance measures need to be part of an integrated management system for careers guidance, information and advice that is carefully designed to achieve optimal overall outcomes.

The challenge which faces the careers guidance sector from the above developments is in large part a financial and economic one. A greater recognition of the economic role of careers guidance can help to meet this challenge, whilst complementing other perspectives on the role of careers guidance, such as those from cognitive psychologists. The need for this recognition is underlined by the economic policy importance of a well-functioning labour market and a reduction in the extent of social exclusion, to which high quality careers guidance can make positive contributions. As we emphasise below, there is a need to incorporate explicit consideration of the role of risk, uncertainty and imperfect information into the economic assessment of the benefits of careers guidance, alongside quality of life issues and wider social benefits.

The role of careers guidance in our present context we take to be:

i. to provide **information** to the individual careers advisee on the changes in net income and other possible payoffs that are likely to result from successfully completing different possible career moves

ii. to elicit information from the **individual advisee** on their **preferences** over different possible characteristics of the payoffs, including those relating to quality of life, that are associated with different possible career choices

iii. to make progress in assessing the **suitability of the individual career advisee** for successfully completing the additional training and/or further education or other investment that is required for different possible career moves, based upon information on the individual's skills, talents and aptitudes.

A framework theory for assessing the benefits of the careers guidance interview can itself help to facilitate progress in the following directions:

a. the attachments of **monetary values** to the benefits generated by the careers guidance interview

b. the assessment of the **enhanced** monetary and other benefits generated by **improved levels of quality** in the careers guidance given in the careers guidance interview

c. the assessment of the **value for money** in service delivery that is provided by different levels of quality in the careers guidance given in the careers guidance interview

d. assisting in the development of **cost-effective standards of service delivery** in careers guidance

e. providing the analytical framework for the development of an **information base** on the contributions made by different individual careers guidance providers

f. assisting in the development of **performance indicators** that can monitor the extent to which the potential benefits, and associated value for money, of the careers guidance interview are being achieved at local regional and national levels

g. assessing the relative **effectiveness** of different individual careers guidance providers

h. providing the analytical framework within which the case for different levels of **financial support** for the careers guidance service, locally, regionally and nationally can be developed in a robust way.

In Sections 2 - 4 below, we seek to identify **micro-economic outcomes and concepts** which are relevant to assessing the benefits of different levels of quality of the advice provided by the careers guidance interview. This includes relevant aspects of the theory of **human capital formation** in Section 2, and the **value of information** in Section 3. The benefits associated from enhancements in **quality of life** resulting from good quality careers advice are discussed in Section 4. In Section 5, we examine the benefits from **good quality careers guidance** from **wider perspectives** than those benefits which accrue directly to the individual recipient of the careers advice. In doing so, we can build upon the earlier contribution of Killeen, White and Watts (1992) on the economic value of careers guidance. These wider perspectives include macro-economic benefits, taxation and social security benefits, public expenditure benefits and other externalities flowing from **improved career choices** and higher quality careers guidance.

2. INVESTING IN HUMAN CAPITAL

In Sections 2 -3 we will initially assume that an individual's monetary income is the only variable which affects the individual's welfare, before turning to the incorporation of other quality of life variables in Sections 4 and 5. Under this assumption, the value of the individual's human capital at the present time (denoted by t = 0) may be expressed as the net present value of their future flow of net income (see Becker, 1993). Net income, Y_{it}, at time t for individual i is itself the difference between individual i's gross income M_{it} at time t and their expenditures, X_{it}, at time t in securing this flow of gross income. These expenditures may include the cost of job-related travel, job-related clothing and any education and training costs which fall upon the individual. In addition, they may include the cost of moving house to locate closer to the new job, and any higher levels of accommodation expenses, such as rents and mortgage payments, in living closer to the location of the new job. These additional expenditure items may be significant if job opportunities and pay levels are greater in some parts of the UK, such as the South East of England, than others, but are also accompanied by higher accommodation, commuting or other such job-related costs.

The future flow of net income $Y_{i0}, \ldots, Y_{in}$ for individual i for the next n years may be denoted by a vector $Y_i = (Y_{i0}, \ldots, Y_{in})$, whose net present value, and associated value of human capital, H_i, for the individual is given by:

$$H_i(Y_i) = NPV_i(Y_i) = \sum_{t=0}^{n} \frac{Y_{it}}{(1+r)^t} \tag{2.1}$$

where r is the discount rate applied to future net income, which is assumed here for simplicity to be constant over time. If we measure each period's net income, Y_{it}, in money terms at the price level prevailing in year t, allowing for general inflation, the relevant discount rate should be in money terms, such as the money rate of interest. Alternatively, if we measure each period's net income, Y_{it}, in real constant-price terms, after netting out the effects of general inflation, the relevant discount rate should be in real terms, such as the real rate of interest (equal to the annual money rate of interest less the annual rate of inflation).

Since career choices may well affect an individual's pension income in retirement, another question which arises here is the time horizon, n, over which the above net present value is taken. One choice would be for n to be the remaining total life-time of the individual, including their period of retirement from work. Their gross income, $M_{i\,t}$, during their retirement years would then be included within the calculation of their human capital in (2.1), but so too would their pension contributions during their working life-times, as expenditures associated with securing their future pension income. An alternative approach would be to treat n as referring only to the period of time before retirement, without deducting pension contributions in the calculation of their net income. However, this would be to neglect potentially large employers' contributions and other factors which might affect the individual's future pension income. Whilst employers' pension contributions might be included as part of the individual's accrued income over their working life, once uncertainty and other factors are taken into account it may be more accurate to consider n as referring to the future life-time of the individual, with an individual's actual standard of living in their retirement years an increasingly important consideration in making life-time career choices.

In the simple case where there is no uncertainty, careers guidance may seek to increase the value of the individual's human capital by helping them to realise a higher level of the net present value of future life-time income. In some cases, such as where careers guidance results in a move directly into a better paid job, this may boost the individual's net income in each future time period. We will then have $)Y_{i\,t} > 0$ for all $t = 1, ... , n$, where $)Y_{i\,t}$ denotes the change in individual i's income in period t which results from the careers guidance. However, in other cases, the careers guidance may result in the individual undertaking a period of further education or training which may cause their net income initially to decline, so that there is an element of **foregone earnings** plus also potentially some **other costs,** in the form of fees, books, and other expenses they would not otherwise have incurred, to the individual in undertaking the future education or training, making the initial values of the changes in net income, $)Y_{i\,t}$, negative in value. However, if the training or education is successful in securing a better-paid job for the individual, later changes, $)Y_{i\,t}$, in the individual's net income will be positive. Figure 2.1 below illustrates the case where, in the absence of careers guidance, the individual would remain at a constant level of net income, Y^o_i, throughout their life. However, as a result of careers guidance, the individual experiences a new time path of net income $Y'_i = (Y'_{i\,0}, .., Y_{i\,t})$.

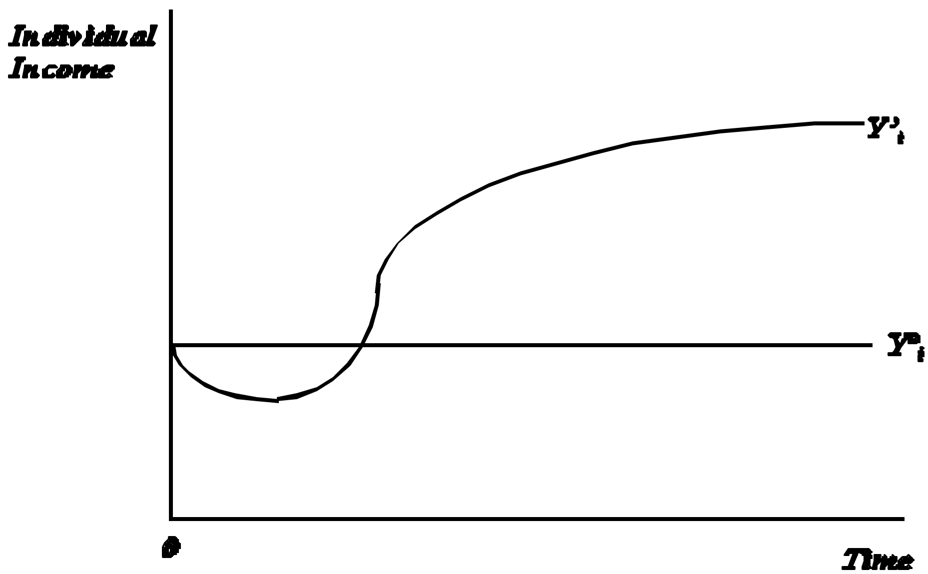

FIGURE 2.1

If the **rate of return** to the individual on this investment in additional education or training exceeds the rate of interest, r, in (2.1) the result will be an overall increase in the net present value, NPV, of future earnings, after taking into account the discounted value of these positive and vertical elements.

The differences in the time path of earnings, Y'_i , after the careers guidance and the time path of earnings in the absence of careers guidance in Figure 2.1 when discounted using the discount factor i will then be positive overall. There is then a boost to the value, H_i , of the individual's human capital in (2.1), with $\Delta H_i > 0$ in (2.2) below:

$$\Delta H_i = \Delta NPV_i = \sum_{t=0}^{n} \frac{\Delta Y_{it}}{(1 + r)^t} \tag{2.2}$$

where) $Y_{i\,t}$ equals $Y'_{i\,t}$ - $Y^{o}_{i\,t}$, the difference in individual i's net income at time t resulting from the careers guidance.

Equation (2.2) gives the **monetary value** of the **value added** to the individual's human capital, with the concept of value added being an important **indicator of performance** and **organisational success** in education (see e.g. Jesson, 2001) and elsewhere (see Kay, 1993). In contrast to standard **League Tables** of the unadjusted examination performance achieved by the pupils in different schools, **value added measures** in secondary and primary education (see Mayston and Jesson, 1999) provide quantitative measures of the **educational progress** which each school achieves for its pupils, after adjusting for their **prior attainment** at earlier stages in the educational process. Schools which achieve high levels of examination passes for pupils who have an advantaged social background and strong prior attainments in earlier stages of the educational process may then achieve a smaller value added than a school which achieves slightly lower levels of examination passes for pupils who are disadvantaged in their social background, and who have weaker prior attainments in earlier stages of the educational process.

Similarly, different careers guidance providers may have client groups who differ significantly in their initial characteristics. A provider that helps to secure well-paid jobs for those from advantaged social and educational backgrounds may achieve less value added than a provider who secures more moderately-paid jobs for those from disadvantaged backgrounds. The value added measure (2.2) is based upon the change in the value of human capital which results from the provision of the careers guidance. As we shall see later, if there is a policy stance of **social aversion to inequality**, the monetary measure may be further adjusted to reflect **diminishing marginal utility of income** to take account of such inequality aversion.

Since the further education and training may involve an element of subsidy from the government, and careers guidance itself costs money to provide, we need also to take these additional costs into account in deriving the overall net benefit from the careers guidance and associated further education and/or training. If we denote by D_i the level of public subsidy in the additional training and/or education which the individual receives, and by C_i the cost of the careers guidance which individual i receives, the overall net benefit is:

$$NB_i = \Delta H_i - D_i - C_i = \sum_{t=0}^{n} \frac{\Delta Y_{it}}{(1+r)^t} - D_i - C_i \qquad (2.3)$$

The social rate of return, s_i , on the investments D_i and C_i is given by the value of the discount rate that yields an overall value of zero to the net benefit, i.e.:

$$NB_i = \Delta H_i - D_i - C_i = \sum_{t=0}^{n} \frac{\Delta Y_{it}}{(1+s_i)^t} - D_i - C_i = 0 \qquad (2.4)$$

being of the form of an **internal rate of return** on these investments. However, it is well known (see Brealey and Myers, 2000) that internal rates of return are not well-behaved indicators of the benefits of investment, in circumstances when some of the future annual benefits, here the ΔY_{it}, can be negative in value. As we have noted, careers guidance may indeed result in the individual incurring initial costs of foregone earnings and other costs associated with additional training or further education, that cause the ΔY_{it}, to become negative in value. A further circumstance under which internal rates of return are not well behaved indicators of the benefits of investment occurs when the investments to be compared are **mutually exclusive**. One form of mutually exclusive investment does indeed occur when we consider different possible levels of quality in the provision of careers guidance. Use of the rate of return on careers guidance derived from internal rate of return calculations, as in (2.4), will then be inappropriate.

In order to consider explicitly different levels of quality in the careers guidance offered to individual i, we may examine the way in which the variables in (2.4) are likely to depend upon the level, Q_i, of quality in the careers guidance offered, where Q_i is a variable that increases with increasing quality of careers guidance for individual i. We would expect firstly that the new time path, Y'_i , of individual i's net income will change with the quality of careers guidance offered, making each Y'_{it} dependent upon Q_i . Since higher quality careers advice may result in individual i undergoing higher initial levels of training and/ further education, each of the new levels of income, Y'_{it} , may not increase with the quality of careers advice,

Q_i . However, we would expect that the value of individual i's human capital, as reflected in the **net present value** of the changes, ΔY_{it} , in their net income which they experience as a result of the careers guidance would increase with the quality of careers guidance offered. However, we would also expect that the cost C_i of the careers guidance would also increase with the quality of the guidance. Thus if the guidance involves the provision of more information, more detailed research and more staff time spent in giving advice to the individual, the associated cost is likely to increase. Higher quality advice may also affect the nature of the additional training and/or further education which the individual undertakes, so that I_i also depends upon Q_i . Because good quality careers guidance may involve avoiding unnecessary high costs of some programmes of further training and education, I_i may not, however, be a simple increasing function of Q_i . When we incorporate the dependency of the relevant variable upon the quality of the careers guidance into (2.4), we obtain:

$$NB_i(Q_i) = \Delta H_i(Q_i) - D_i(Q_i) - C_i(Q_i) = \sum_{t=0}^{n} \frac{Y_{it}^{r}(Q_i) - Y_{it}^{o}}{(1+r)^t} - D_i(Q_i) - C_i(Q_i) \qquad (2.5)$$

We would expect that the net benefit of careers guidance to initially increase with the quality of the guidance offered. Better quality careers guidance should be able to point the individual in the directions of greater increases in the net present value of future increases in net earnings than poorer quality careers advice. In addition, good quality careers advice may initially be feasible without significant increases in its costs of provision compared to those involved in the provision of poorer quality careers advice. Similarly, it may discover more appropriate avenues of additional training or further education from the individual concerned for the same, or lower, level of public subsidy. All these factors will make the net benefit, NB_i , of the careers guidance to be an increasing function of the quality of the careers guidance over an initial range of increasing quality, as in Figure 2.2 below.

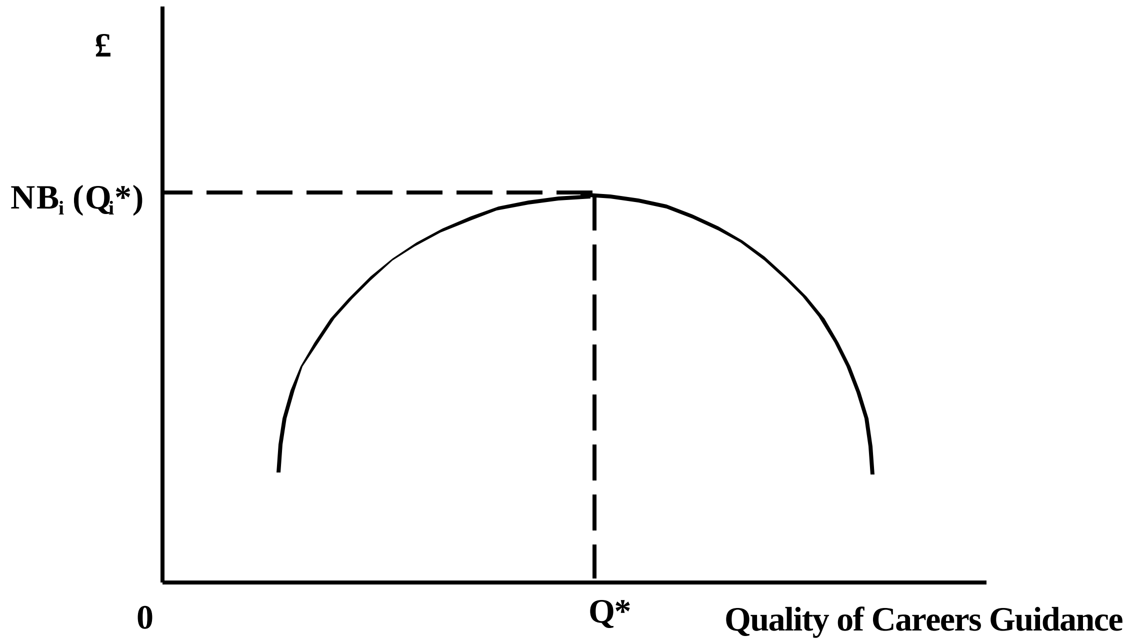

FIGURE 2.2

However, after some point, we might expect **diminishing returns** to set in, causing the additional net present value of future earnings which results from increases in the quality of careers guidance to become smaller in value. Achieving successive increases in this net present value may involve more expensive programmes of training and/or further education that cause I_i to increase with Q_i after some point. Providing higher quality of careers guidance after any initial inefficiencies and ineffective forms of guidance have been eliminated may also involve increasing costs of provision. These factors mean that at some optimal level of quality, Q_i*, the net benefit of the careers guidance is likely to reach its maximum value NB_i (Q_i*), as in Figure 2.2.

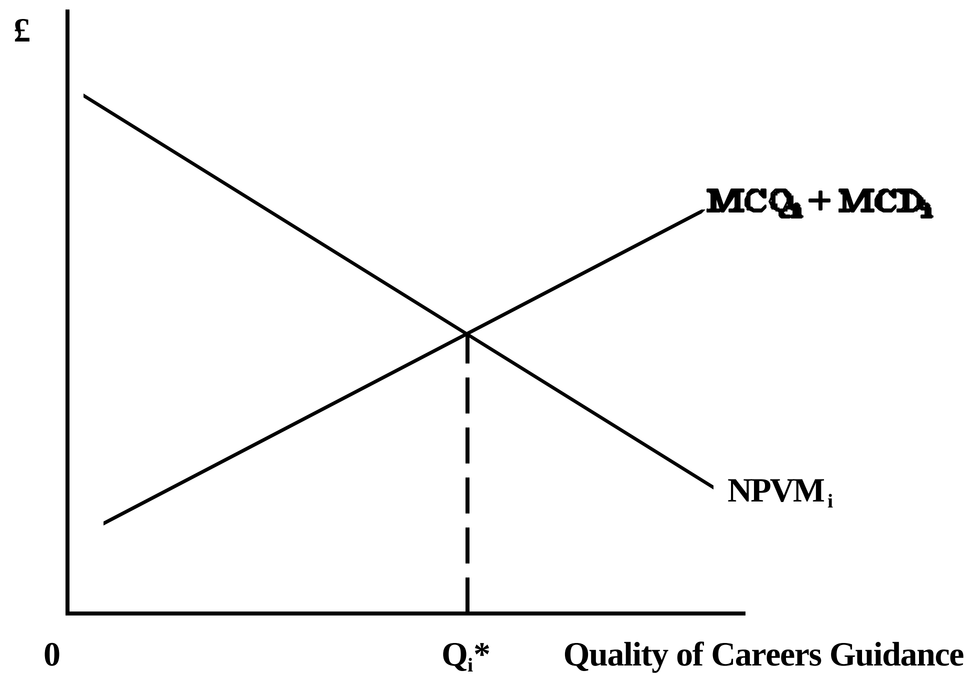

FIGURE 2.3

At the optimal level of quality, $NPVM_i$, i.e. the net present value of the marginal increases in the individual's future net income that greater quality of careers guidance yields, can be shown to be equal to MCQ_i , the marginal cost of greater quality in the careers guidance, plus MCD_i , the marginal cost of the subsidy for any additional training or further education for the individual that results from the additional quality of careers guidance, as in Figure 2.3. The maximum value NB_i (Q_i*) of the net benefit that is attained when the quality of the careers guidance is at its optimal level can then be used as a **benchmark** by which to compare the **outcomes achieved** by different careers guidance service providers for this type of individual. It also forms an essential part of a **cost-benefit analysis** of the net benefits that result from providing optimal levels of quality of careers guidance to individual advisees.

This implies that careers guidance service providers should **record and monitor** as far as possible the levels of **income** that the individual advisee is likely to receive over their future years if no careers guidance is given, and the levels of income they are likely to receive if they follow the careers guidance, net of any additional **job-related expenditures** they are likely to incur, together with the **costs** of the careers guidance and the **subsidy element** of any additional training or further education that the individual will undergo as a result of the careers guidance. Predictions of the levels of future income that the individual might achieve as a result of their careers advice might draw upon statistical databases, such as that provided by the New Earnings Survey (DfEE, 1998).

In order to make this process operational, however, recognition needs also to be given to the different **factors** which impact upon the maximum value $NB_i (Q_i^*)$ that are **outside the control** of individual careers guidance service providers. These factors will include:

i. the general **state of the economy**, nationally, regionally and locally, in the current and future time periods, as measured by relevant economic indicators, such as national, regional and local rates of unemployment and vacancies in occupations relevant to the careers prospects of the individual advisee.

ii. the **initial skills, education, training and aptitudes** of the individual i to whom careers guidance is being given.

The development of a systematic database of these variables would facilitate the assessment of the **relative efficiency and effectiveness** of different careers guidance providers in generating improvements in the future time paths of net earnings, and associated human capital, of their advisees, adjusted for differences across individual providers and over time in the above exogenous factors. There are a number of statistical techniques which could be used in this assessment, such as **multivariate regression analysis** (see e.g. Mayston and Jesson, 1999), **stochastic frontier analysis** (see e.g. Mayston, 2002), and **Data Envelopment Analysis** (see e.g. Mayston and Jesson, 1988). Such an assessment could assist both in the evaluation of the relative efficiency and effectiveness of individual careers guidance providers and in the identification of **best practice value for money** in the provision of high quality careers guidance.

3. INDIVIDUAL CAREER DECISIONS AND THE VALUE OF CAREERS GUIDANCE

3a. Careers Decisions Under Uncertainty

An important further dimension of investment in human capital that has implications for the evaluation of the quality of careers guidance is that of **risk and uncertainty**. Investment in human capital in the form of additional training or further education or other significant changes in career direction may involve a large element of **sunk cost** that cannot easily be recovered if wrong career choices are made. Such investment, however, typically takes place in the presence of some significant degree of **uncertainty at the time the initial investment** decision is made about the **future outcomes and future degree of success** of the investment decision. Whilst the costs of the additional training or further education may be ascertained with reasonable certainty, the **probability** of any given individual advisee **achieving any given target level of success** in completing the training or education, given the individual advisee's initial skills, education, training and aptitudes, needs to be carefully assessed by the careers guidance provider in formulating their careers advice. We would expect in general higher quality careers guidance to be characterised by **more accurate assessments** of the chances of success of individual advisees in achieving different possible levels of performance in additional training and education, and in helping to equip individual advisees with the **motivation and preparation** to have **a high probability of success** in the goals they chose following the careers guidance.

Similarly, we would expect high quality careers guidance to be characterised by more accurate assessments of the likely economic prospects for career moves in different possible directions. The sunk cost nature of many investments in human capital means that the foregone earnings and other costs that may be incurred in undertaking new training or education in the hope of long-term career betterment may prove to be a costly mistake if the anticipated boost to future net income does not occur, because of economy-wide, industry-specific, or other reasons. These costs will also typically involve a large element of **opportunity costs**, through the individual devoting scarce time in additional training and further education or other career changes, which might otherwise have been invested more productively with greater long-term gains, had higher quality careers guidance have been given.

Another important feature of investment in human capital by an individual is that it typically involves a high level of **specific, undiversifiable, risk**. An investor in the Stock Exchange is able to **spread their risk** over many different shares through diversifying their individual portfolio. As a result they need only bear general **systematic risk** that results from **economy-wide uncertainties**, through holding a market portfolio of shares, such as through an index fund, in combination with a riskless asset, as in the Capital Asset Pricing Model of finance theory (see Brealey and Myers, 2000). In contrast, an individual investing in **their own specialised human capital**, makes more specific investments in **particular skills and knowledge acquisition** that make them exposed to many **specific factors** that affect particular jobs and industries. As a result, **high quality careers guidance** needs to be able to **inform individual careers advisees** of the nature of these specific risks which they will face as a result of investing in particular need skills and specialised knowledge. In addition, high quality careers guidance needs to be able individuals advice on how to **manage these risks**, such as through making investments in training and qualifications which will give the individual **flexibility** to later change jobs and/or careers if an initial choice does prove to be less rewarding than initially anticipated.

The importance of both uncertainty and high quality careers guidance are reinforced also by the **time lag** which is likely to occur between the initial decision to make new investments in human capital and the pay-off time when the full benefits of the investment are realised. In a stylised **Arrow-Debreu** world of economic theory, individuals could in advance of their investment enter into **forward contracts** with known pay-offs from their planned investment in additional training or further education, given different future circumstances, to deliver their labour in advance for a price which is agreed in advance. However, in practice, employment contracts are often only available once the initial investment in new human capital has been made. In the meantime, the pay-off from the investment may change due to many economy-wide and career specific changes taking place during the time lag. High quality careers guidance plays an important role in providing the individual career advisee with **information** with which they can form **realistic expectations** of the future changes in net income which are likely to result from different possible career moves.

The careers guidance also needs to take a broad view of **economic trends and changes** which will influence future levels of wages resulting from different career moves. Moreover it needs to take account also of the additional complication that the level of future wages for a given career depends upon how many individuals across the economy as a whole are advised and attracted to move into it. If a career initially looks very attractive, many individuals may invest in pursing it, so that by they time they qualify there is an excess supply of qualified individuals chasing the available jobs. As a result, their earnings may be **depressed below their expected level**, and the rate of return on their investment in human capital prove to be lower than anticipated. In the limit, this may produce a **cob-web cycle** where the relevant labour market goes from high wages to low wages, and then with a lag back to high wages as the supply of new recruits dries up in the face of low wages. Being able to identify cases where there is this danger arguably forms part of high quality careers guidance.

We may incorporate risk and uncertainty into our analysis of the benefits of careers guidance through the concept of **expected utility,** using the tools of **decision analysis** (See Bunn, 1984; French, 1989). If net income is again the only variable which the individual careers recipient values, we may define a **utility of income function** $U_{it}(Y_{it})$. If the individual is **averse to risk**, this will have a shape similar to the curve in Figure 3.1 below.

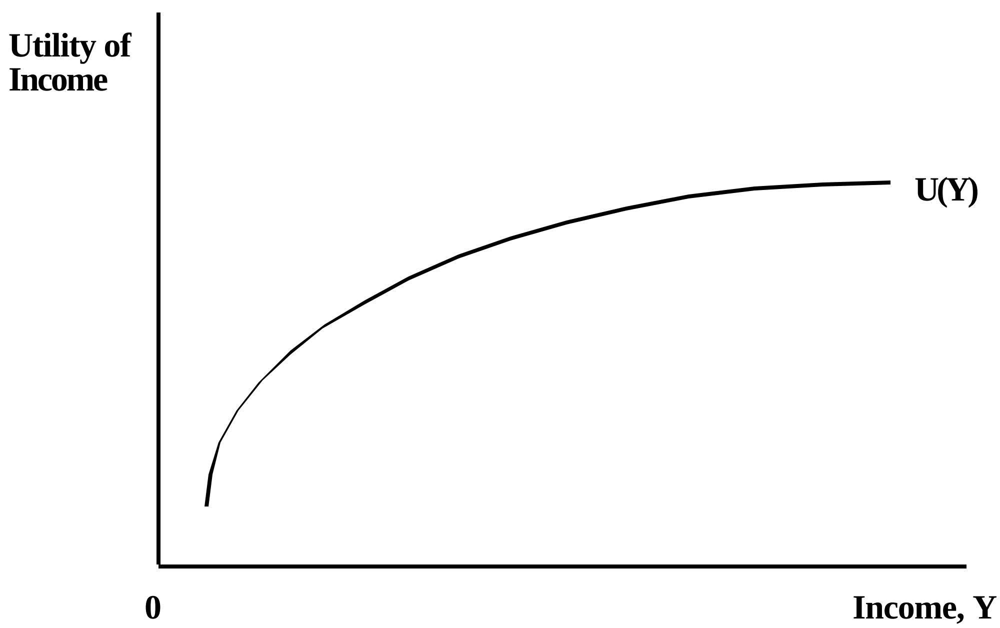

FIGURE 3.1

The slope of the curve in Figure 3.1 corresponds to the **marginal utility of income**, which in Figure 3.1 is positive, but declining, so that the individual is better off with more income, but has **diminishing marginal utility of income**. This property implies the individual is **risk averse**, so that whilst increases in income make the individual better off, a given absolute increase in income does not increase the individual's utility level as much as a fall in income of the same absolute amount would lower the individual's utility level. One important example of such a utility of income function is that given by taking the natural logarithm of income, i.e.

$$U_{i\,t}\,(Y_{i\,t}) = \log Y_{i\,t} \tag{3.1}$$

which has the property that the marginal utility of income is given by $1/Y_{i\,t}$, which diminishes as $Y_{i\,t}$ increases, and which tends to zero as income rises infinitely, and becomes very large when income falls close to zero, reflecting the large loss of utility the individual suffers if their income drops to a very low level. The use of (3.1) also has the advantage that it may be readily computed for any given value to $Y_{i\,t}$. If the individual is not risk averse, but simply **risk neutral** , we may simply make use here of $Y_{i\,t}$ as indicating the pay-off to the individual at time t, i.e.

$$U_{i\,t}\,(Y_{i\,t}) = Y_{i\,t} \tag{3.2}$$

We may now proceed to analyse **the value of careers guidance to an individual advisee**. To do so, we need first to recognise that some individuals may make a career move even in the absence of careers guidance. For the sake of simplicity, we will consider a two-period analysis in which if the individual makes the career move career move they must incur at time t = 0 an initial investment cost of I_i , which may includes foregone earnings during a period of additional training or further education, and/or costs of relocation to search for a new job in a different geographic area. If the investment in the career move proves to be successful, the individual will receive a new higher level of net income, equal to Y^s_{i1} , at time t = 1. If it proves to be unsuccessful, they will receive a lower level of net income, equal to $Y^f_{i\,t}$. The chances of their being successful in the absence of a detailed assessment of their skills, aptitudes and abilities by a careers adviser are given by the probability p^s_i , with the chances of their being unsuccessful in the career move given by $(1 - p^s_i)$.

The expected benefit which the individual faces in the absence of careers guidance if they do make the career move is given by:

$$E^a(U^m{}_i) = p^s{}_i \,.U^s{}_i + (1 - p^s{}_i).U^f{}_i \qquad (3.3)$$

where $U^s{}_i = U_{i\,o}\,(Y^o{}_{i\,o} - I^s{}_i) + U_{i\,1}\,(Y^s{}_{i\,1})$ and $U^f_i = U_{i\,o}\,(Y^o{}_{i\,o} - I^s{}_i) + U_{i\,1}\,(Y^f{}_{i\,1})$

and where we assume any time preference is embodied within the utility function at each point in time.

If in the absence of careers guidance they do not make the career move, they will stay their levels of income, $Y^o{}_{i\,o}$, and $Y^o{}_{i\,1}$ in these two periods of time, with a resultant utility level with certainty of:

$$U^o{}_i = U_{i\,o}\,(Y^o{}_{i\,o}) + U_{i\,1}\,(Y^o{}_{i\,1}) \qquad (3.4)$$

The overall position in the absence of careers guidance is illustrated in Figure 3.2 below.

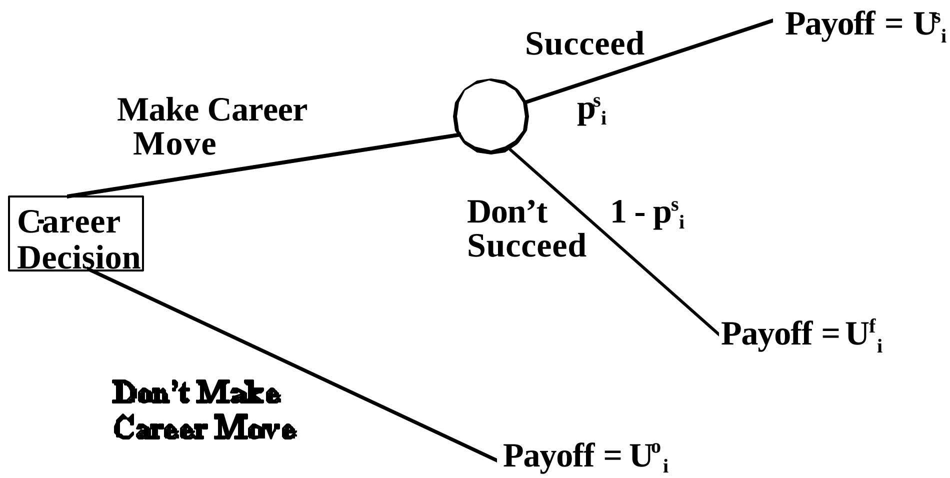

FIGURE 3.2

A numerical example of Figure 3.2 is one where the probability of success in the career move without careers guidance, is 40 per cent, i.e. $p^s_i = 0.4$, the level of net income of the individual if they do not make the career move is $Y^o_{i\,o} = Y^o_{i\,1} = £10{,}000$, the initial investment cost in making the career move is £2,000, and the level of income which they will receive if the career move succeeds is $Y^s_{i\,1} = £19{,}000$, whilst the if they do not succeed they will have net income of $Y^f_{i\,1} = £10{,}000$ in period one. If the individual is risk neutral with zero time preference, we have from equations (3.2) and (3.3) an expected benefit if they make the career move of:

$$E^a(U^m_i) = 0.4\ (£8{,}000 + £19{,}000) + 0.6\ (£8{,}000 + £10{,}000) = £21{,}600 \qquad (3.5)$$

If the individual does not make the career move, they receive $Y^o_{i\,o} = Y^o_{i\,1} = £10{,}000$ in both periods, with a total benefit from (3.2) and (3.4) of:

$$U^o_i = £20{,}000 \qquad (3.6)$$

implying that the individual would be better off here making the career move.

3b. The Value of Perfect Careers Guidance

We may now consider the case of **perfect careers guidance**, which we define here in terms of the careers guidance interview, and any related tests, being able to **fully assess** the abilities, skills and attributes of the individual so that as a result of this assessment the individual can be accurately advised as to whether or not they will succeed in the career move. We will also assume that perfect careers guidance can accurately assess the future state of the economy, so as to be able to **perfectly predict** the payoff, Y^s_{i1}, the individual advisee will receive if they do make a successful career move, as well as being able to accurately assess the investment cost I_i which they will incur in undertaking the career move. The advantage of such careers guidance is that the individual may defer their career decision until they have received this guidance, which as in Figure 3.3 below, is assumed to result in either a positive assessment of the suitability of the individual for the career move, or a negative assessment.

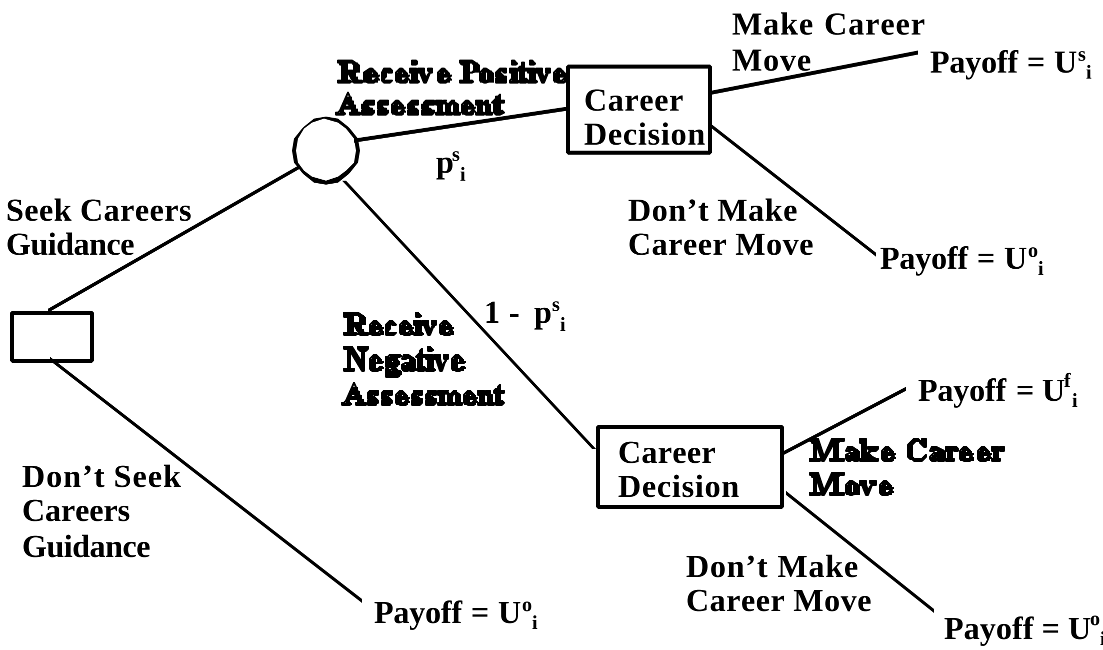

FIGURE 3.3

If the individual receives a positive assessment, they may proceed to make their career decision in the knowledge that the career move will be successful. Since the payoff, U^s_i , the individual receives if the career move is successful exceeds the payoff, U^o_i, the individual receives if they do not make the career move, the individual will decide here to make the career move, with a resultant payoff of U^s_i . If, however, the individual receives a negative assessment, they will proceed to make their career decision in the knowledge that the career move will be unsuccessful. Since the payoff, U^f_i , the individual receives if the career move is unsuccessful is lower than the payoff, U^o_i, the individual receives if they do not make the career move, the individual will decide here not to make the career move, with a resultant payoff of U^o_i .

The expected benefit to the individual advisee if they seek the careers guidance then depends upon the probability of their receiving a positive assessment. Before the detailed assessment of their aptitudes, skills and abilities by the careers service, which will then discover whether or not they will be successful, this probability is p^s_i, the probability of their being successful in the absence of detailed careers assessment of whether or not they will succeed in the career move. The expected benefit to the individual advisee if they seek the perfect careers guidance is then:

$$E^g_P\ (U_i) = p^s_i \cdot U^s_i \quad + (1 - p^s_i) \cdot U^o_i \tag{3.7}$$

In our above numerical example, we have $p^s_i = 0.4$, U^s_i = (£8,000 + £19,000) = £27,000, and U^o_i = £20,000. Hence in this example:

$$E^g_P\ (U_i) = 0.4 \cdot £27,000 \quad + 0.6 \cdot £20,000 = £22,800 \tag{3.8}$$

The value, or expected net benefit, of the perfect careers guidance in this case is then £1,200. It is equal to the difference between the expected benefit of £21,600 in (3.5) of their career decision without the careers guidance and their expected benefit of £22,800 if they seek the careers guidance. In this example, the net benefit from the careers guidance results from the individual avoiding making the careers investment of £2,000 in those cases where they would not make a success of the career move, with these cases occurring with a probability of 0.6.

In other cases, the value of the careers guidance derives from the individual making a beneficial career move they would not otherwise have made. Thus if the investment cost in making the career move had been £4,000, we would have:

$$E^a(U^m_i) = 0.4\ (£6,000 + £19,000) + 0.6\ (£6,000 + £10,000) = £19,600 \tag{3.9}$$

and instead the individual would not have made the career move, but instead would have remained with the benefit of U^o_i = £20,000 in (3.6) from not making the career move. The benefit from the careers guidance if the investment cost rises to £4,000 would now be:

$$E^g{}_P\ (U_i) = 0.4\ .\ £25{,}000 \quad + 0.6\ .\ £20{,}000\ = £22{,}000 \qquad (3.10)$$

This exceeds the benefit of $U^o{}_i$ = £20,000 in (3.6) from not making the career move by £2,000, so that the **expected net benefit from the careers guidance improving the individual's career choice** is now equal to £2,000. This in turn equals the net gain of £5,000 (= £9,000 - £4,000) which the individual makes from their investment in the career move if they receive a positive assessment times the probability of 0.4 of their receiving a positive assessment in the careers guidance.

More generally**, the value, VPG, of the perfect careers guidance** to an individual who seeks the careers guidance is equal to the difference between their expected benefit, $E^g\ (U_i)$, with the perfect careers guidance, and their expected benefit, $E^a\ (U_i)$, in the absence of the careers guidance, i.e.

$$VPG_i = E^g{}_P\ (U_i) - E^a\ (U_i) \qquad (3.11)$$

where $E^g{}_P\ (U_i)$ is given by equation (3.7), and where:

$$E^a\ (U_i) = E^a(U^m{}_i) \text{ if the individual makes the career move} \qquad (3.12)$$

and $$E^a\ (U_i) = U^o{}_i \quad \text{if the individual does not make the career move} \qquad (3.13)$$

in the absence of careers guidance.

If the individual is correctly informed regarding the value of $p^s{}_i$, and the payoffs and investment costs associated from the career move, we will have:

$$E^a\ (U_i) = \max\ (\ E^a(U^m{}_i)\ ,\ U^o{}_i\ ) \qquad (3.14)$$

with the individual deciding on the career move according to whether or not it will increase their expected benefit calculated using these correct values.

3c. The Value of Imperfect Careers Guidance

Whilst perfect careers guidance may be a useful benchmark for comparing performance, the careers guidance offered in practice may not provide a perfect assessment of the skills, abilities and aptitudes of the individual for meeting the needs of the proposed career move. Instead, the imperfect careers guidance would give a positive assessment to the individual, even when the individual possesses the attributes which would lead them to succeed in the career move, in less than 100 per cent of such cases, so that the chances of the imperfect careers guidance correctly identifying that the individual has the attributes to succeed in the career move is only

$$0 < p_i(P^*S) < 1.0 \qquad (3.15)$$

with a positive probability, $p_i(N^*S) = 1 - p_i(P^*S) > 0$, of the imperfect careers guidance giving a negative assessment to the individual even though they have the attributes to succeed in the career move. Similarly, imperfect careers guidance would have a probability, $p_i(N^*F)$, less than one hundred per cent of give a negative assessment to individuals with attributes that would lead then not to make a success of the career move. There is then a positive probability, $p_i(P^*F) = 1 - p_i(N^*F) > 0$, of the imperfect careers guidance giving a positive assessment to the individual even though they do not have the attributes to succeed in the career move.

As a result of such imperfect careers guidance, the probability, $p_i(S^*P)$, of the individual succeeding in the career move following a positive assessment by the careers guidance service is now less than one. Rather, there is some positive probability $p_i(F^*P) = (1 - p_i(S^*P))$ of the individual failing in the career move even if they are given a positive assessment. Similarly, imperfect careers guidance means that the probability, $p_i(F^*N)$, of an individual who has received a negative assessment failing in the career move is less than one. Rather, there is some probability, $p_i(S^*N) = (1 - p_i(F^*N))$, of the individual who receives a negative assessment succeeding in the career move if they attempt it.

From Bayes' theorem (see Bunn, 1984), we may compute:

$$p_i\,(S*P) = p^s_i \,.\, p_i\,(P*S\,) \,/\, [\, p^s_i \,.\, p_i\,(P*S\,) + (\,1 - p^s_i\,) \,.p_i\,(P*F\,)] \qquad (3.16)$$

and $$p_i\,(S*N) = p^s_i \,.\, p_i\,(N*S\,) \,/\, [\, p^s_i \,.\, p_i\,(N*S\,) + (\,1 - p^s_i\,) \,.p_i\,(N*F\,)] \qquad (3.17)$$

with the overall probability of the individual receiving a positive assessment given by:

$$p_i\,(P) = p_i\,(P*S\,) \,.\, p^s_i + p_i\,(P*F\,) \,.\, (\,1 - p^s_i\,) \qquad (3.18)$$

and the overall probability of the individual receiving a negative assessment given by:

$$p_i\,(N) = p_i\,(N*S\,) \,.\, p^s_i + p_i\,(N*F\,) \,.\, (\,1 - p^s_i\,) = 1 - p_i\,(P) \qquad (3.19)$$

The benefit of the imperfect careers guidance can then be computed from this data and the associated Figure 3.4 below.

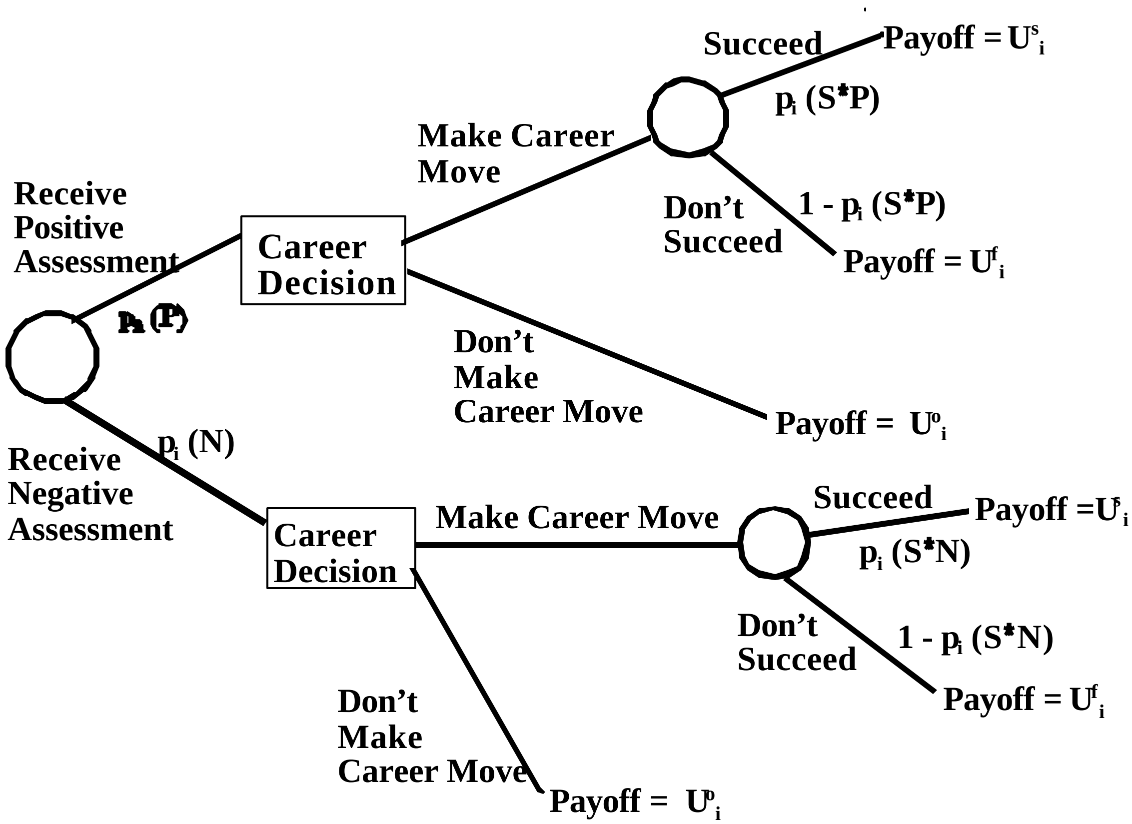

FIGURE 3.4

The individual making their career choice is now faced with poorer quality information and advice as a result of the imperfect careers guidance. If they are given a positive career assessment, rather than face a known payoff from a career move of U^s_i , the career move has an uncertain expected benefit of:

$$E^m (U_i \ {}^*P) = p_i (S^*P).\ U^s_i + p_i (F^*P).\ U^f_i < U^s_i \qquad (3.20)$$

which will result in the individual deciding against the career move if $E^m (U_i \ {}^*P)$ is less than U^o_i , and a lower expected benefit than the value of U^s_i which they would have had if they had received a positive assessment under perfect careers guidance. careers advice.

Compared to perfect careers advice, imperfect careers advice has the following disbenefits which will reduce its value compared to prefect careers advice:

a. When given a positive recommendation to make a career move, some individual advisees will decide not to make the career move because they know that there is some positive probability, here of p_i (F*P) , of the career move failing to be a success for them, even though they have received a positive recommendation to make the move. As a result, they will lose the chance of the benefit, U^s_i , which they would have received had the career move been a success for them, but instead remain with the smaller payoff, U^o_i , from not making the career move. This will result in **a Type I error** of the individual **rejecting the career move even though it would have been beneficial for them**.

b. When given a positive recommendation to make a career move, some individual advisees will decide to make the career move, but will find later that the career move was not successful for them, but instead has the worse outcome U^f_i . They will then have incurred the investment cost involved in the career move following the positive recommendation from the careers guidance, but not received a positive return on this investment. This will result in **a Type II error** of **the individual investing in the career move even though it is unsuitable for them**.

c. When given a negative recommendation to make a career move, some individuals will decide to make the career move because they know that there is some positive probability, here equal to p_i (S*N), less than one that they may still be successful, but will find later that the career move is not successful for them, ending up with the worse outcome U^f_i . This will be a further source of **a Type II error,** of the individual investing in the career move even though it is unsuitable for them.

d. When given a negative recommendation to make a career move, some individuals will decide not to make the career move, even though there is a positive probability, here equal to p_i (S*N), that they may still be successful. Because the imperfect careers guidance cannot distinguish perfectly between individuals who will be successful in the career move and those who will be unsuccessful, it will give a negative assessment to some who would have been successful in the career move. As a result, those individuals who decide not to make the career move because of the negative assessment they have been given, even though they would have been successful in the career move, lose out on the benefit, U^s_i , they would have received, and instead stay with the smaller payoff, U^o_i , from not making the career move. This will be a further source of **a Type I error** of the individual rejecting the career move even though it would have been beneficial for them.

The **cost, or dis-benefit, of making a Type I error** is given by the loss of the potential benefit:

$$U^s_i - U^o_i \tag{3.21}$$

the individual would have gained had they made the career move when they had the attributes to be successful in it. The **cost, or dis-benefit, of making a Type II error** is given by the loss of the benefit from not making the career move compared to unsuccessfully investing in the career move:

$$U^o_i - U^f_i \tag{3.22}$$

when the individual does not have the attributes to be successful in it.

The extent and frequency of the dis-benefits from the imperfect careers guidance will be a reflection of the quality of the careers guidance offered. The highest quality careers guidance will be that corresponding to the case of **perfect careers guidance** whose expected net benefit is computed above, and where **the risk of Type I and Type II errors is zero** for those individuals who seek the careers guidance. An important index of the quality of the careers guidance offered will be the expected net benefit it achieves, and **how close the imperfect careers guidance gets to the expected net benefits which would be achieved by perfect careers guidance**. The **index of quality, Q_i, of the careers guidance given to individual i** may then be expressed as:

$$I(Q_i) = VIG_i / VPG_i = [E^g_I (U_i) - E^a (U_i)] / [E^g_P (U_i) - E^a (U_i)] \tag{3.23}$$

$$\text{where } E^g_I (U_i) = p_i(P) . E(U_i {}^*P) + p_i(N) . E(U_i {}^*N) \tag{3.24}$$

$$E(U_i \,^*P) = \max (E^m (U_i \,^*P), U^o_i) , \quad E(U_i \,^*N) = \max (E^m (U_i \,^*N), U^o_i) \qquad (3.25)$$

so that the individual's expected utility, given a positive assessment, is the higher of their expected utility in (3.20) if they decide to make the career move as a result of a positive assessment, and the utility level, U^o_i , they would achieve without the career move, and similarly for a negative assessment.

We can see the effects of lower quality careers guidance on the magnitude of the expected net benefits from the careers guidance also in terms of our earlier numerical example. As noted above, imperfect careers guidance involves a less than one hundred per cent reliability rate in the careers guidance giving the individual a positive assessment when the individual advisee does have the attributes to succeed in the career move. If this reliability rate is only 80 per cent, this implies:

$$p_i \,(P^*S) = 0.8 \qquad (3.26)$$

Similarly, imperfect careers guidance involves a less than one hundred per cent reliability rate in the careers guidance giving the individual a negative assessment when the individual advisee does not have the attributes to succeed in the career move. If this reliability rate is only 75 per cent, this implies:

$$p_i \,(N^*F) = 0.75 \qquad (3.27)$$

From equations (3.16) - (3.19) above, and our earlier example where the overall probability of success in the career move was 0.4, we have as an implication of these less than 100 per cent reliability rates by the imperfect careers guidance that:

$$p_i \,(S^*P) = 0.681,\ p_i \,(F^*P) = 0.319,\ \ p_i \,(S^*N) = 0.151,\ p_i \,(F^*N) = 0.849 \qquad (3.28)$$

i.e. the chances of an individual being successful in the career move if given a positive careers guidance assessment are now only 68.1 per cent, whereas they were previously 100 per cent under the perfect careers guidance. 15.1 per cent of the career advisees would still have succeeded despite being given a negative assessment under the imperfect careers guidance. In addition we have:

$$p_i (P) = 0.47, p_i (N) = 0.53 \qquad (3.29)$$

so that the overall probability of an individual being given a positive assessment has risen from the value of 0.4 which it would have been under perfect careers guidance to 0.47 under this example of imperfect careers guidance, and that of a negative assessment has fallen from 0.6 under perfect careers guidance to 0.53. Whilst the individual has a higher chance of being given a positive assessment and recommendation of making the career move under the imperfect careers guidance, the accuracy rate of a positive assessment correctly implying that the individual has the attributes for success in the career move is, however, only 68.1 per cent.

In order to compute the expected net benefit from the imperfect careers guidance, we must work backwards through the tree in Figure 3.4 to assess which career decisions the individual would have made when faced with these new probabilities of success following a positive or negative assessment by the careers guidance. From (3.2), if the individual careers advisee receives a positive assessment from the careers guidance, the individual has an expected payoff from making the career move of:

$$E^m (U_i \; {}^*P) = p_i \; (S^*P).U^s_i \; + p_i \; (F^*P).U^f_i \; = (0.681) \; . \; £25,000 + (0.319). \; £16,000 = £22,130 \qquad (3.30)$$

where the payoff is U^s_i = [£6,000 + £19,000] as previously if the career move is successful, and the payoff is U^f_i = [£6,000 + £10,000] as previously if the career move is unsuccessful .Since the resultant expected value of £22,130 exceeds the payoff of U^o_i = £20,000 from not making the career move, the individual will chose to make the career move when given a positive assessment. However, under imperfect careers guidance, there is now a much higher probability, of 0.319 rather than zero, of the careers move actually working out to be unsuccessful for the individual even though they received a positive assessment and recommendation to make the career move.

The individual has an expected payoff from making the career move if they receive a negative assessment from the careers guidance of:

$$E^m (U_i \ ^*N) = p_i (S^*N).U^s_i + p_i (F^*N).U^f_i = (0151) .£25,000 + (0.849).£16,000 = £17,359 \quad (3.31)$$

which is lower than the payoff of U^o_i = £20,000 from not making the career move, so that the individual will chose here not to make the career move if given a negative assessment, thereby giving up some chance of making a successful career move under the imperfect careers guidance.

Given the overall probabilities of 0.47 and 0.53 of receiving a positive, or negative, assessment from the imperfect careers guidance in this example, **the overall expected benefit from the imperfect careers guidance** is:

$$E^g_I (U_i) = (0.47) . £22,130 \quad + (0.53) . £20,000 = £21,000 \qquad (3.32)$$

The value, VIG, of the imperfect careers guidance to an individual who seeks the careers guidance is equal to the difference between their expected benefit, $E^g_I (U_i)$, with the imperfect careers guidance, and their expected benefit, $E^a (U_i)$, in the absence of the careers guidance, i.e.

$$VIG_i = E^g_I (U_i) - E^a (U_i) = £21,000 - £20,000 = £1,000 \qquad (3.33)$$

where $E^a (U_i)$ = £20,000 as previously. The value of the imperfect careers guidance is still positive, and better than no careers guidance. Without careers guidance, the individual would have rated their chances of success in the career move at only p^s_i = 0.40, i.e. 40 per cent. With a positive assessment from the careers guidance, their chances of success are 0.681, i.e. 68.1 per cent. However, this is still substantially short of their 100 per cent chances of success in the career move if they had received a positive assessment under perfect careers guidance.

Indeed, compared to the perfect careers guidance, which had a value of £2,000 to the individual in (3.10), the effect of the **lower quality** of the imperfect careers guidance is to **halve its value** to only £1,000. This halving in value, moreover, results from the fall in the reliability of the careers guidance, from 100 per cent to 80 per cent for a positive assessment, and from 100 per cent to 75 per cent for a negative assessment, which some might consider to be still fairly high reliability rates. However, **lower reliability of the careers**

guidance may result in individuals making costly investments in unsuccessful career moves which they would not have incurred in the absence of a positive careers guidance assessment. Even lower reliability rates than 80 per cent and 75 per cent for the careers guidance would result in even lower expected net benefits.

The index of quality of the careers guidance offered to individual i from (3.23) is:

$$I(Q_i) = VIG_i \ / \ VPG_i = £1{,}000 \ / \ £2{,}000 = 50 \text{ per cent} \tag{3.34}$$

The above discussion highlights the following key points:

i. the value of careers guidance must be determined **relative to** the expected payoff the individual would achieve in the absence of the careers guidance. Thus the fact that some individuals make beneficial career moves **following** careers guidance is not sufficient to establish the value of the careers guidance. Instead, the value needs to be determined relative to the career choices they would have made in the absence of the careers guidance.

ii. a large part of the benefit from the careers guidance is likely to come from the encouragement it gives to individuals who could benefit from the career move to make a career move they would not otherwise have made this decision, if they had not received a positive assessment from the careers guidance that gave them the confidence to undertake the investment cost without much fear of it not paying off for them. This involves **reducing the frequency of Type I errors** of individuals rejecting career moves for which they have the attributes to succeed and which would have been beneficial to them.

iii. a further part of the value of the careers guidance in the above analysis comes from enabling the individual advisee to avoid costly investments in career moves which do not payoff for the individual, as a result of the careers guidance making an assessment of their suitability for the career move. If this assessment is reliable, the individual advisee can make a career choice without much risk of undertaking a costly investment in a career move which fails to payoff. Part of the net benefit of the careers guidance then comes from **reducing the frequency of Type II errors** by helping individual advisees to avoid costly investments in career moves which they would have made in the absence of the careers advice, but which are unlikely to pay off for them.

iv. the expected net benefit from the careers guidance may well be **significantly reduced by a lower level of reliability** in its ability to identify the attributes in the individual advisee which will contribute towards success in the career move.

3d. The Cost of Inaccurate Careers guidance Information

Imperfect careers guidance may involve not only imperfect assessments of the suitability of any given individual advisee for making a success of the investment required for a particular career move. It may also involve inaccuracies in the information given to the advisee as to the magnitude of the changes in net income which they will receive if they are successful in the career move. Thus the careers guidance might that predict the net income which the individual will receive if they are successful in the career move is $Y^{sg}_{i\,t}$ rather than its true value of $Y^{s}_{i\,t}$, and $Y^{f\,g}_{i\,t}$ if they are unsuccessful, rather than the true value of $Y^{f}_{i\,t}$. In addition the imperfect careers guidance may predict the investment cost which the individual must incur to make the career move to be I^{g}_{i} rather than its true value of I_{i} .

Such inaccurate information is likely to change the decisions of some individuals in Figure 3.4 as to whether or not to undertake the career move following a careers assessment. An inaccurately high estimate of the net income which will result from making the career move if the initial investment in it is successful, or an inaccurately low estimate of the cost of the investment required, is likely to induce more individuals to undertake it than if the information had been accurate. Similarly, an inaccurately low estimate of the net income which will result from making the career move if the initial investment in it is unsuccessful, or an inaccurately high estimate of the cost of the investment required, is likely to dissuade more individuals from undertaking the career move than if the information had been accurate.

There is then **a greater risk of Type I and Type II errors** than if the information had been accurate. **The cost of such inaccurate information** is equal to the **increased frequency** such inaccuracy produces **in**

the occurrence of the Type I and Type II errors times the respective costs of these Type I and Type II errors, as given by equations (3.21) and (3.22) above. The accurate assessment of these costs in equations (3.21) and (3.22) itself requires accurate information on the magnitude of the investment costs in undertaking the career move, the level of the net income the individual would receive if they did not make the career move and its associated investment, the future net income which the individual would receive if they were successful in the career move, and the future net income which the individual would receive if they were unsuccessful in the career move.

3e. The Effect of Multiple Possible Career Moves

In the above analysis we have considered the case where the subject for discussion and assessment by the careers guidance interview is one possible career move. In the case of perfect careers guidance, the career move being considered would be the one which is optimal for the individual advisee. We may define such an **optimal career move** as the one which would maximise the individual's utility level, U^s_i , from the resultant flow of net income that the optimal career move generates, chosen from amongst all possible career moves for which the individual would be given a positive assessment as to their suitability to succeed. Thus even though there may be multiple possible career moves for the individual, our above analysis for the case of perfect careers guidance still holds when we interpret U^s_i in this way. The utility level, U^o_i , which the individual would attain without the career move is the one the individual would choose from all possible careers open to the individual, if the individual did not make use of the advice on offer from the careers guidance.

In the case of imperfect careers guidance, there is a risk that the careers guidance may imperfectly assess the suitability of any given individual advisee for a particular career move. In addition, there is a risk that the information given by imperfect careers guidance on the changes in net income that result from a given career move will be inaccurate. As a result, when there are multiple possible career moves which might be the subject of consideration in the careers guidance interview, there is a risk that the individual will chose a career move which is not the optimal career move for them.

We may again, however, formulate the analysis in terms of the risks of Type I and Type II errors occurring. Our earlier definition of **a Type I error** being one where the individual rejects the career move even though it would have been beneficial for them can now be modified in the case of multiple possible career moves to the following definition. A Type I error is now one where **the individual does not undertake the career move which would be optimal for them** (as defined above) but instead selects a less beneficial career option. This less beneficial career option may be making no career move at all compared to the individual's existing career. Alternatively, under imperfect careers guidance it may involve the choice of a career move which is less suitable for the individual than their optimal career move, and hence results in a lower utility level for the individual than their optimal career move would.

We may now modify the calculation of the cost of a Type I error from that in equation (3.21) for the case of a single possible career move to that for multiple possible career moves being:

$$U^s_i - U^j_i \qquad (3.35)$$

where U^j_i is the utility level of the individual when they succeed in the less beneficial career option j. This is chosen by them in place of the optimal career move, when they are given less than fully accurate information by the imperfect careers guidance. U^s_i is the utility level they would have had if they had made their optimal career choice and succeeded in it. The case j = 0 corresponds to the career option of making no career move at all compared to remaining with the individual's existing career. However, the cases j = 1, .. , J can correspond to other possible career moves the individual may make as a result of the imperfect careers guidance. Partly as a result of such Type I errors, the imperfect careers guidance achieves a lower level of expected net benefit than would perfect careers guidance, where the risk of Type I and Type II errors occurring for the individuals who receive the perfect careers guidance is zero.

In order to compute the **overall expected net benefit lost through Type I errors** from having imperfect careers guidance, rather than perfect careers guidance, the relative **frequency** of individuals choosing each of the different possible career options other than their optimal career moves, and succeeding in them, needs to be assessed. We will denote by h (O_j * c_i , g_i) the relative frequency of an individual with the same characteristics, in terms of initial skills, aptitudes and talents making the choice of the career option O_j and succeeding in it, after receiving the careers guidance g_i. c_i can here be a vector (i.e. a list or set) of different characteristics of the individual careers advisee which are relevant to their career choice. We will denote by m (c_i , g_i) the number of individuals with the particular set of characteristics c_i who receive the imperfect careers guidance g_i. The **total expected net benefit lost through Type I errors from having imperfect careers guidance, rather than perfect careers guidance, for such individuals** is then:

$$NBL_{i1} = \sum_{j=0}^{J} (U_i^s - U_i^j) .\ h(O_j | c_i,\ g_i).\ m(c_i,\ g_i\ ) \tag{3.36}$$

The **overall expected net benefit lost through such Type I errors across all individuals who make use of the imperfect careers guidance of quality level Q** is given by summing (3.36) across all the types of individual who make use of this careers guidance, i.e.

$$NBL_1(Q) = \sum_{c_i} \sum_{j=0}^{J} (U_i^s - U_i^j) .\ h(O_j | c_i,\ g_i).m(c_i,\ g_i\ )\ \ where\ \ g_i = g_i(Q) \tag{3.37}$$

where the guidance g_i given to individual i depends upon the quality, Q, of the careers service on offer.

When there is only one career move being considered, the **cost, or dis-benefit, of making a Type II error** is given by the loss of the benefit from not making the career move compared to unsuccessfully investing in the career move:

$$U^o_i\ -\ U^f_i \tag{3.38}$$

as in equation (3.22). When there are several possible career moves, the extent of the cost of a Type I error depends upon which of these possible career moves the individual chooses as a result of the imperfect careers guidance. If the individual choose career option O_j for j = 1, ..., J, a Type II error occurs when they unsuccessfully invest in this career move and it does not payoff for them , compared to not making a career move and remaining with their existing career where their payoff would be U^p_i . Instead they receive only the payoff U^{fj}_i if they fail to be successful in their investment in career option j. The **extent of the cost, or dis-benefit, of the Type II error** is therefore:

$$U^o_i - U^{fj}_i \tag{3.39}$$

when the individual does not succeed in their chosen career option j .

In order to compute the **overall expected net benefit lost through Type II errors** from having imperfect careers guidance, rather than perfect careers guidance, the relative **frequency** of individuals choosing each of the different possible career options other than their optimal career moves, and failing to succeeding in them, needs to be assessed. We will denote by $f\,(O_j \mid c_i, g_i)$ the relative frequency of an individual with the same characteristics, in terms of initial skills, aptitudes and talents, making the career move to the career option O_j but failing to make a success of it, after receiving the careers guidance g_i . The **total expected net benefit lost through Type II errors from having imperfect careers guidance, rather than perfect careers guidance, for individuals with these characteristics** c_i is:

$$NBL_{i2} = \sum_{j=0}^{J} (U_i^o - U_i^{fj}).\ f\,(O_j \mid c_i,\ g_i).m(c_i,\ g_i) \tag{3.40}$$

The **overall expected net benefit lost through Type II errors across all individuals who make use of the imperfect careers guidance** is given by summing (3.40) across all the types of individual who make use of this imperfect careers guidance, i.e.

$$NBL_2(Q) = \sum_{c_i} \sum_{j=0}^{J} (U_i^o - U_i^{fj}).\ f\,(O_j \mid c_i,\ g_i).m(c_i,\ g_i)\ \ where\ \ g_i = g_i(Q) \tag{3.41}$$

A final difference between the benefits achieved under imperfect careers guidance and those which would have been achieved under perfect careers guidance occurs for the following reason. **Under perfect careers guidance**, **more individuals are likely to make use of the careers service** than under imperfect careers guidance, because the expected net benefit to them of making use of the careers guidance is likely to be greater. Because of this**, less individuals will make their own Type I errors**, of not undertaking a career move which would have been beneficial to them, **through failing to make use of careers guidance** under perfect careers guidance than they would under imperfect careers guidance. Similarly, **less individuals will make their own Type II errors**, of unsuccessfully investing in career moves which are unsuited to them, through failing to make use of careers guidance under perfect careers guidance than they would under imperfect careers guidance.

The benefit of perfect careers guidance, compared to the imperfect careers guidance, g_i , from this source of reduction in Type I errors is then given by:

$$NBL_3(Q) = \sum_{c_i} \sum_{j=0}^{J} (U_i^s - U_i^j).\ h(O_j | c_i,\ a_i).[m(c_i,\ g_i^p) - m(c_i,\ g_i)] \qquad (3.42)$$

where $g_i = g_i(Q)$ and $h(O_j | c_i, a_i)$ is the relative frequency of an individual with the characteristics c_i making the choice of the career option O_j and succeeding in it, in the absence of careers guidance. The term $m(c_i, g^p{}_i)$ denotes the number of individuals who would make use of the perfect careers guidance if it was available to them.

Similarly, the benefit of perfect careers guidance, compared to the imperfect careers guidance, g_i , from this source of reduction in Type II errors is given by:

$$NBL_4(Q) = \sum_{c_i} \sum_{j=0}^{J} (U_i^o - U_i^{fj}).\ f(O_j | c_i,\ a_i).[m(c_i,\ g_i^p) - m(c_i,\ g_i)] \qquad (3.43)$$

where $g_i = g_i$ (Q) and f (O_j *c_i , a_i) is the relative frequency of an individual with the characteristics c_i making the choice of the career option O_j and not succeeding in it, in the absence of careers guidance.

3f. The Effect of Under-Informed Potential Careers Guidance Advisees

We also need to assess the significance of individuals in the population at large, who are potential careers guidance advisees, themselves being **under-informed** as to the potential benefits and chances of success of careers moves which they might make. Such lack of information will in part be reflected in **inaccurate assessments which they themselves make in the absence of careers guidance of their own chances of success** if they were to make any given career move **and of the net income they would receive** if they did make such career moves. Thus, in terms of **their own decision tree** in Figure 3.5 below, the subjective estimates, $p^{s'}{}_i$, which they of their own chance of success of a given career move, may be out of line with estimates based upon more objective information. Similarly, their subjective assessments, $U^{s'}{}_i$, of the payoffs to them if they were to succeed and of the payoff, $U^{sf'}{}_i$, to them if they were to be unsuccessful in their investment in the career move, may be out of line with the actual payoffs, $U^s{}_i$ and $U^{sf}{}_i$, they would receive if they made the career move.

As a result of such inaccurate assessments, there is likely to be an **increased risk that the individuals themselves will, in the absence of careers guidance, make a Type I error.** This will result from them not undertaking a career move they could have made a success of and which would have been beneficial to them. Similarly, there may be **an increased risk that they will, in the absence of careers guidance, make a Type II error.** This will result from their undertaking a career move which does not prove successful for them, and which makes them worse off than if they had remained with their existing career.

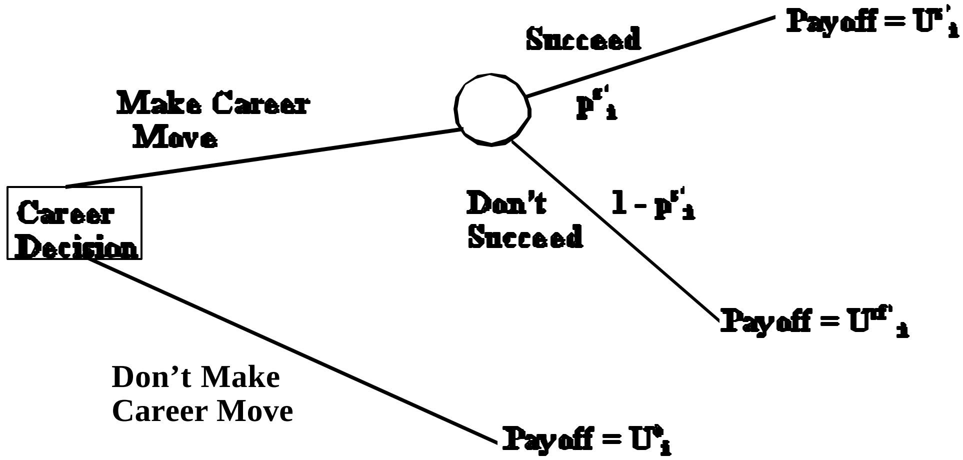

FIGURE 3.5

The effects of these increased risks of under-informed individuals making their own Type I and Type II errors in the absence of careers guidance is the following. The first is to **increase the total expected net benefit from good quality careers guidance compared to the individuals receiving no careers guidance**. The number of individuals, h (O_j * c_i , a_i) , who, in the absence of good quality careers guidance, make career choices, such as O_j , which are not optimal for them, even though they succeed in them, and for which there is therefore still a Type I error, will be greater in (3.42) when these individuals are more under-informed. Similarly, the number of individuals, f (O_j * c_i , a_i) , who, in the absence of good quality careers guidance, make career choices, such as O_j , which are not optimal for them, and in which they do not succeed with a resultant Type II error, will be greater in (3.43) when these individuals are more under-informed.

However, a second effect of more under-informed individuals in the population at large may be to **make them less aware of the potential benefits of them making use of good quality careers** guidance. This will tend to reduce the size of both h (O_j * c_i , g_i) in equation (3.37) and f (O_j * c_i , g_i) in equation (3.41). The overall effect of a more under-informed population on the net benefits from the careers guidance will depend upon the relative strength of these two effects.

3g. The Total Benefit from Perfect and Imperfect Careers Guidance

Perfect careers guidance by definition results in all the individuals who make use of the careers guidance being perfectly assessed as to their suitability to succeed in different possible career moves and receiving advice as to their optimal career move, which the individual advisee can then invest in knowing that they will succeed in it. The total benefit from giving perfect careers guidance to individual i is then **equal to the payoff, U^s_i, which each individuals with characteristics c_i receive when they succeed in their optimal career choice less the cost $C_i(Q^p_i)$ of providing the careers guidance to individual i at this perfect level of quality.** For the sake of simplicity, we will ignore here any external subsidy element which is involved in any additional training or education. The total benefit from giving perfect careers guidance to all individuals who receive it is equal to the total net benefit to individual i times the number of individuals $m(c_i, g^p{}_i)$ with the characteristics c_i who make use of the perfect careers guidance, summed over all the types of individual who use the careers guidance. We therefore have:

$$TB(Q^p) = \sum_{c_i} (U_i^s - C_i(Q_i^p)).m(c_i, g_i^p) \tag{3.44}$$

To compute **the total net benefit from providing perfect careers guidance, rather than providing no careers guidance**, we must subtract from (3.44) the total benefit, TBA, which individuals would have received in the absence of any careers guidance. This will equal:

$$TBA = \sum_{c_i} [u_i^o + N_{i1} - N_{i2}].\ M(c_i) \tag{3.45}$$

$$\text{where } N_{i1} = \sum_{j=1}^{J} (u_i^j - u_i^o).h(O_j|c_i, a_i) \tag{3.46}$$

$$N_{i2} = \sum_{j=1}^{J} (u_i^o - u_i^{fj}).f(O_j|c_i, a_i)] \tag{3.47}$$

The first component, u^o_i, in the square bracket of (3.45) in the computation of TBA reflects the baseline net income which all individuals with characteristics c_i receive if they make no career move. $M(c_i)$ is the total number of individuals in the population who have the characteristics c_i. The second component, N_{i1}, in (3.45) and (3.46) reflects the increased payoff above this baseline which those individuals with characteristics c_i receive if they succeed in each of the difference possible career moves they might make. The third component, N_{i2}, of (3.45) and (3.47) reflects the loss in net income below the baseline level which individual who invest in career moves but are unsuccessful in them suffer. The term d^j_i reflects the subsidy element which the career move j by individual i involves.

The total benefit, TB(Q), from imperfect careers guidance of quality Q is equal to that from perfect careers guidance less the cost, or dis-benefit, associated with the increased Type I and Type II errors discussed above, i.e.

$$TB(Q) = TB(Q^p) - NBL_1(Q) - NBL_2(Q) - NBL_3(Q) - NBL_4(Q) \qquad (3.48)$$

where $NBL_1(Q)$ and $NBL_2(Q)$ are the increased losses which arise from those individuals who use the imperfect careers guidance making Type I and Type II errors which they would not have made had they received perfect careers guidance. $NBL_3(Q)$ and $NBL_4(Q)$ are the increased losses from increased Type I and Type II errors due to the fall in numbers of individuals who make use of the careers guidance when it is imperfect. **The higher the quality of careers guidance given, the smaller will the sum of these four terms be.**

An **overall index, I(Q) of the quality of the careers guidance** given is provided by the ratio:

$$I(Q) = TB(Q) / TB(Q^p) \qquad (3.49)$$

with I(Q) = 1.0 = 100 per cent for perfect careers guidance, but declining below 100 per cent the greater are the Type I and Type II errors involved in (3.48).

The **total net benefit, TNB(Q), from providing imperfect careers guidance of quality Q,** rather than providing no careers guidance, is given by:

$$TNB(Q) = TB(Q) - TBA + [C(Q^p) - C(Q)] \tag{3.50}$$

where TBA is the total benefit TBA which individuals would receive, inclusive of Type I and Type II errors, in the absence of any careers guidance in equation (3.45). The last term in the square bracket in (3.50) equals the saving in administrative cost which may occur through running an imperfect careers guidance service at quality level Q rather than a perfect one at quality level Q^p . In a parallel way to Section 2 above, we may define **an optimal quality, Q*, of careers guidance** as the quality level which maximises (3.5), and which will therefore involve:

$$MTB(Q^*) = MC(Q^*) \tag{3.51}$$

i.e. equating the marginal total benefit, MTB(Q), of additional quality in the provision of careers guidance to the marginal cost, MC(Q), of providing the higher quality careers guidance at the optimal quality level Q*.

Where part, or all, of the cost of providing higher quality careers guidance falls upon the individual career advisee, through an additional fee, this will shift part, or all, of the total cost from the career guidance provider and their funding source on to the individual advisee. If this additional fee is included within the computation of the marginal total benefit to the individual advisee, the result will be a reduction in the left-hand side of equation (3.51) by the amount of this additional fee, so long as they are willing to pay for this quality of careers guidance at the increase fee level. If we interpret the right-hand side of equation (3.51) as referring to the cost to the career guidance provider net of fee income, the RHS of equation (3.51) will also be reduced by the same amount. So long as the demand for careers guidance is not **price sensitive** to the level of fees, this will leave the optimal quality of careers guidance unchanged.

3h. The Information Required to Evaluate the Monetary Benefits of Improved Quality of Careers Guidance

We have seen in our above analysis that the concept of perfect careers guidance provides a useful **benchmark** against which lower quality careers guidance can be evaluated. As noted above, perfect careers guidance results in all the individuals who make use of the careers guidance being perfectly assessed as to their suitability to succeed in different possible career moves and receiving advice as to their optimal career move, which the individual advisee can then invest in knowing that they will succeed in it. We have also made use of the concept of a *vector* (or *list* or *set*) of the **characteristics**, c_i , of the **skills, aptitudes and talents of the individual advisee** which are relevant to their careers guidance and their suitability for different possible career moves.

This suggests that **an information base is needed of the different relevant characteristics of careers advisees who make use of each careers guidance service, and of the type of career options which would be most suited to them, given these individual characteristics, if they had the benefit of perfect careers guidance**. The evaluation of the monetary benefits of each optimal career option requires information on the magnitude of the investment costs in undertaking the career move and the future net income which the individual would receive as a result of successfully making their optimal career move. This needs to be compared with the future net income which the individual would expect to receive in the absence of any careers guidance. Given that individuals may be risk averse, and experience diminishing marginal utility of income when facing the consequences of career investment decisions involving uncertainty, an adjustment to these monetary values may be made by taking the logarithms of the monetary outcomes to convert them to utility-adjusted values.

We have also made use of the concept of Type I and Type II errors in the evaluation of the monetary benefits of careers guidance that is less than perfect. A Type I error is one where the individual does not undertake the career move which would be optimal for them but instead selects a less beneficial career option, where this less beneficial career option may be making no career move at all compared to the individual's existing career. A Type II error occurs when an individual unsuccessfully invest in a career move and it does not payoff for them , compared to their not making a career move and remaining with their existing career. The **evaluation of the cost of Type I errors** requires information on the lower level of net income they will receive if they make a less beneficial career move, and the numbers of individuals who receive the imperfect careers guidance who choose such less beneficial career options. The **evaluation of the cost of Type I errors** requires information on the lower level of net income they will receive if they make a less beneficial career move and succeed in them, and the numbers of individuals who receive the imperfect careers guidance who are successful in such less beneficial career options. The **evaluation of the cost of Type II errors** requires information on the even lower level of net income they will receive if they make a less beneficial career move and do not succeed in them, and the numbers of individuals who receive the imperfect careers guidance who are unsuccessful in such less beneficial career moves.

In addition, an assessment is required of the difference in the numbers of individual career advisees that a poor quality careers guidance service attracts compared to the number of individuals who they would have attracted if they had offered perfect careers guidance, and the associated monetary value of the reductions in Type I and Type II errors which could have been achieved by such individuals not make their own career decisions without sound careers guidance.

Whilst, for the sake of simplicity, we have focused on a two-period analysis in this section, our earlier insights from Section 2 above on the **value of human capital** derived from a multi-period analysis still hold. The information on future net income required in the multi-period analysis is **the discounted value of future net income**, adjusted where desirable by taking the logarithm of net income to allow for risk aversion and diminishing marginal utility of income.

4. IMPROVING THE QUALITY OF LIFE

In this section we relax our earlier assumption that net income is the only benefit accruing to the individual careers advisee as a result of a career move. Instead we allow for the possibility that other quality of life variables may enter into the utility function of the individual careers advisee, both during the periods of time in which the individual is working in a specifies job or during periods of time in which they are engaged in training or further education.

One important existing approach to incorporating quality of life assessments into the measurement of overall net benefits is that provided by the concept of the **Quality Adjusted Life Year (QALY)** in health economics. The basic approach to the use of this concept involves the use of a **valuation matrix** that seeks to value the relative importance of different combinations of the underlying quality of life variables on a scale from zero to one. A value of zero corresponds here to being dead, whereas a value of one corresponds to perfect health.

Two main quality of life variables which have been used to evaluate states of health between full health and death are **physical mobility** and **freedom from pain**. As in Kind, Rosser and Williams (1982), the variable representing states of physical disability has been given eight possible values, namely I corresponding to no disability; II to slight social disability; III to severe social disability or slight impairment of performance at work, or both, with ability to perform all housework except heavy tasks;. IV to the choice of work or performance at work severely limited, and with housewives and old people only able to carry out light housework and shopping; V to unable to undertake any paid employment, unable to continue education, old people confined to home except for escorted outings or short walks, and housewives only able to perform a few single tasks; VI to be confined to a chair or wheelchair; VII to being confined to bed; and VIII to being unconscious. Four levels of pain and distress for each of these levels of disability were defined, with A = none, B = mild, C = moderate, and D = severe. The median valuations for each of these combinations (such as VI C) were derived from the responses of 70 individuals, including doctors, compared to the zero-one scale from perfect health to being dead. Some combinations involving severe disability and/or high levels of distress were given a negative score, with the implication that they were considered as worse than being dead. The resultant valuations defined the associated **Rosser Index** for the health states corresponding to these combinations of the underlying quality of life variables.

Under conditions of certainty, a given medical intervention, such as a surgical operation, on a patient would be expected to result in some increase in life expectancy of the patient and/or improvement in the quality of their life compared to their existing life expectancy and existing quality of life without the intervention. Thus in Figure 4.1, the patient in the absence of the surgical intervention might be expected to live 5 more years, with a quality of life profile, according to the Rosser Index measurement, that deteriorates slightly in the first four years and then declines rapidly in the fifth year. After the surgical intervention, the patient has an enhanced life expectancy of 10 years, with a quality of life in the first five years above that which they would have received without the surgical intervention, but which declines substantially as they approach the tenth year. The shaded area indicates the QALY measure of the benefit of the operation, taking into account not only the length of extended life gained but also the increase in the quality of life of each year of life.

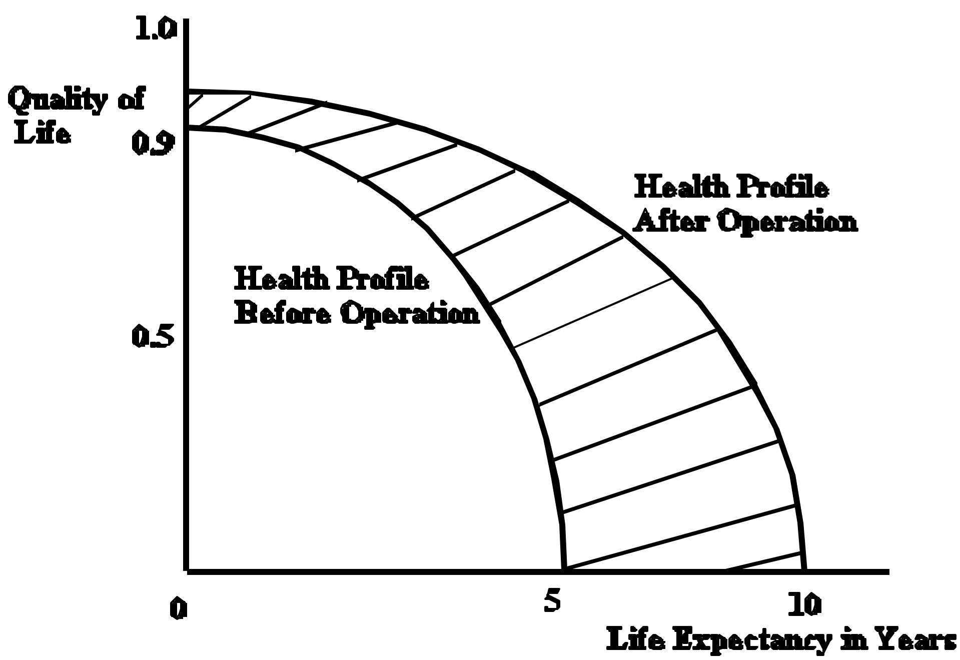

FIGURE 4.1

The analysis may be extended to take into account risk and uncertainty. Thus if there is an 80 per cent chance of the satisfactory outcome of the surgical operation in Figure 4.1, but a 20 per cent chance of death during the operation, the latter is given a value of zero weighted by the probability of 0.2, which is then added to the above increase in QALYs if the operation is successful multiplied by the probability of 0.8 of the operation being successful (see Williams, 1985).

There are five main methods which have been used to elicit individual valuations on the quality of life associated with different health states (see Torrance, 1986; Dolan, 2000). The first of these is the **Visual Analogue Scale** (VAS) which, in a similar way to the Rosser Index, asks respondents to rate the different health scales on a numerical scale between the best outcome of one (or one hundred per cent) and the worst outcome of zero. The psychometric **bisection method** (see Stevens, 1971) then asks individuals to rate the health state which they consider to be approximately midway on this scale, followed by the health states which they consider approximately midway between this health state and the best and worst health states respectively, and so forth until finer and finer divisions are made in the interval scale to classify health states and their corresponding qualities of life.

The second method for deriving individual valuations on the quality of life uses the **Standard Gamble (SG)** approach. Here individuals are asked to consider an operation or other form of medical treatment with two possible quality of life outcomes, a good outcome, L_g , if the operation is successful, and a bad outcome, L_b , if it is unsuccessful. The probability of the treatment being a success is given by q and the probability of it not being a success is given by (1 - q). Under the expected utility approach, this gamble will have an expected utility of:

$$E(U) = q\, U(L_g) + (1 - q).\, U(L_b) \qquad (4.1)$$

The individual is then asked to consider an intermediate health state (better than death) with a quality of life of L_m, as an alternative to facing the risk of the medical treatment. They are then asked to assess the value of the probability of success of the medical treatment which would make them indifferent between facing the uncertain medical treatment, with its possible good outcome, L_g , for the quality of life, but also its possible bad outcome, L_b , and having instead the intermediate quality of life, L_m , with certainty. For this probability q', we then have:

$$U(L_m) = E(U) = q'. U(L_g) + (1 - q'). U (L_b) \tag{4.2}$$

If the good outcome, L_g , corresponds to perfect health, with a standardised utility rating of 1.0, and the bad outcome, L_b , corresponds to death, with a standardised utility rating of 0, (4.2) yields:

$$U(L_m) = q' \tag{4.3}$$

so that the utility which the individual attaches to the intermediate quality of life, L_m , can be derived directly from the probability of the good outcome at which the individual respondent would be indifferent between these two prospects, and will lie between zero and one.

To evaluate qualities of life, L_w , worse than death, the intermediate state chosen is death, with the medical treatment offering the prospect of full health (with a standardised utility rating of 1.0) with probability q and of the outcome, L_w , with probability 1- q. For the probability, q", at which the individual is indifferent between this gamble and death with certainty (with its associated standardised utility rating of zero), we have:

$$0 = q'' + (1 - q''). U(L_w) \quad \text{i.e. } U(L_w) = - q'' / (1 - q'') \tag{4.4}$$

so that a quality of life that is considered to be worse than death has a negative utility rating, given by q" over (1 - q").

The third main approach to deriving quality of life valuations in health economics is **the Time Trade-Off (TT-O) method**. This method asks individuals to consider two alternative prospects under certainty. The first prospect involves living for x years of perfect health (with a standardised utility rating of 1.0 for each year) and then dying straight-away. The second prospect involves living for a greater number, y, years, but with a lower quality of life, L_m . If x' is the number of years of perfect health for which the individual would be indifferent between these two prospects, we have under the QALY approach that values years times quality of life ratings:

$$x' = y.\, U(L_m) \text{ so that } U(L_m) = x'/\, y \tag{4.5}$$

For a quality of life, L_w , that is worse than death, the choice presented to the individual is firstly immediate death, and secondly y years with quality of life L_w followed by x years of perfect health. If x" is the number of years of perfect health at which the individual is indifferent between these two prospects, we have:

$$0 = y.\, U(L_w) + x'' \text{ i.e. } U(L_w) = -\, x''/\, y \tag{4.6}$$

The fourth main method for valuing quality of life in health economics is the **Person Trade-Off (PT-O) method**, which considers choices between two treatments that will benefit different numbers of individuals, so that a trade-off is derived between the total number of years of healthy life enjoyed by x individuals and the total number of years with a lower quality of life enjoyed by y individuals (see Dolan, 2000; Williams and Cookson, 2000).

The fifth main method for valuing quality of life is **the Willingness To Pay (WTP) approach**, which considers how much money each individual would be prepared to pay for improvements in their quality and length of life. This incorporates their valuation of the length and quality of life into their own preference assessment for all variables which affect their overall welfare. However, willingness to pay will depend not just upon an individual's relative preference between quality and length of life and other variables, such as immediate satisfaction from the consumption of commodities which may cause later health problems. It will also depend upon the individual's ability to pay and level of income. Simply adding individual willingnesses to pay across individuals will give more implicit weight to richer individuals, who are more able to pay than poorer individuals. To counteract this effect and instead incorporate considerations of **distributional equity** into the analysis, different logarithmic weights may be attached to each individual's willingness to pay, such as by considering the overall measure of benefits:

$$B = \sum_i WTP_i^{1-\varepsilon} \quad for \quad \varepsilon \neq 1 \tag{4.7}$$

where WTP_i is the willingness to pay for increases in the quality and length of life of individual i, and ε is a coefficient reflecting the degree of social **aversion to inequality** in the distribution of the monetary value of the benefits from increased quality and length of life (see Atkinson, 1970). For the case of $\varepsilon = 1$, we have:

$$B = \sum_i \log\ (WTP_i) \tag{4.8}$$

In order to **incorporate quality of life variables, other than net income, into our analysis of the benefits of careers guidance**, we must first identify these other variables. These will be ones which, alongside net income, affect the overall payoff to the individual of choosing any particular career option. These other quality of life variables may include:

i. the level of mental interest which the individual has in the tasks involved

ii. the level of mental stress which the individual experiences

iii. the level and nature of the physical activity involved in the tasks

iv. the level of self-esteem which the individual derives from the activities and status involved

v. the extent of the control over their activities which the individual has

vi. the sense of achievement which the individual derives from the activities

vii. the extent of social interaction the individual has with their colleagues and customers

viii. the extent of social esteem which the individual derives

ix. the travel time taken between the individual's home and place of work or study

x. the level of stress/enjoyment experienced during travel between the individual's home and place of work or study

xi. the amount and quality of the time which the individual spends with their partner when the individual has the specified job, education or training

xii. the amount and quality of the time which the individual spends with their children when the individual has the specified job, education or training

xiii. the extent and quality of the social interaction which the individual has with others outside the workplace when they have the specified job, education or training

xiv. the quality of schooling which the individual's children receive when the individual is living in the accommodation the individual lives in when they have the specified job, education or training

xv. the extent of the physical activity the individual engages in outside their job, training or education

xvi. the extent of substance abuse which the individual engages in

xvii. the quality of the physical environment which the individual experiences in their place of work, training or education

xviii. the quality of the physical environment which the individual and their family experience outside the place of work, training or education when the individual has the specified job, or is undertaking the education or training.

Several of these variables may in turn feed into the level of **job satisfaction** which the individual derives from the job, training or education, and the level of **physical and mental health** which the experience as a result of undertaking it. If we are able to measure the above variables in a meaningful way, we may represent these (non-income) quality of life variables for individual i at time t as a vector $L_{it} = (L_{it1}, ..., L_{itm})$, where L_{itj} denotes the level of the jbh quality of life variable for individual i at time t. The future time path of quality of life variable which the individual experiences may also be represented by the vector $L_i = (L_{i1}, ... L_{in})$.

We may now extend the concept of the individual's human capital to include these quality of life variables through amending our earlier equation (2.1) to become:

$$H_i(Y_i\ ,\ L_i) = \sum_{t=0}^{n} U_{it}(Y_{it}\ ,\ L_{it}) \tag{4.9}$$

where the individual utility functions U_{it} for each period of time t embodies also the individual's relative weight which they put upon benefits received at time t compared to other times, and hence their subjective degree of time preference. One role for high quality careers guidance is again to make the individual advisee more aware of the extent of the enhanced net income and quality of life which they may experience in future years as a result of a career move, and hence to pay more attention to these future benefits.

In the case of career moves which improve the individual's physical and mental health status, direct use may be made of the evaluation techniques discussed above for measuring the resultant increases in Quality Adjusted Life Years which the individual thereby experiences, either from improved quality of life or from extensions in the length of life, or both. However, in the case of quality of life variables which do not predominantly affect the individual's physical and mental health, we need to incorporate these non-income quality of life variables into the analysis alongside income variables, as in equation (4.9).

The **increase in the value of human capital** which the individual experiences as a result of a career move can now be evaluated as:

$$\Delta H_i = \sum_{t=0}^{n} [U_{it}(Y'_{it}\ ,\ L'_{it}) - U_{it}(Y^o_{it}\ ,\ L^o_{it})] \tag{4.10}$$

where $Y^o_{i\,t}$ and $_{Yoi\,t}$ are the value of the net income and quality of life variables of the individual at time t before the career change and $Y'_{i\,t}$ and $_{Y'i\,t}$ are their value after the career change. This formulation allows for the possibility that the individual's net income and the different (non-income) quality of life variables may each change in different ways over the future years as a result of the career move, some potentially initially falling but later increasing, but not all necessarily going in the same direction. Thus a career move may result in higher net income in later years but also more time in commuting to work in a way which reduces the relevant non-income quality of life variable.

The **relative importance** of each of these income and quality of life variables depends upon the individual's preferences and associated utility function $U_{i\,t}$ at each point in time. Micro-economic analysis suggests that each individual will have an indifference map between these variables embodying these preferences and utility function. Our earlier **decision analysis** framework using a utility of income function based upon the single variable of income can be extended to decisions with **multiple-attributes** (see Keene and Raiffa, 1976; French, 1989), involving not just income but also other quality of life variables. This is illustrated in Figure 4.2 below for the illustrative case of two variables, with $Y_{i\,t}$ representing individual i's net income at time t and $L_{i\,t\,j}$ the value of their (non-income) quality of life variable j at time t. The combination of net income and quality of life variable at point a is here considered by the individual as equivalent to the combination at point b, which has a higher level of net income but a lower quality of life variable than at point a. The slope of the indifference curve through a and b represents the **trade-off** or marginal rate of substitution between net income and the quality of life variable for the individual. If the individual suffers a further fall in the quality of life in going from point b to point k in Figure 4.2, they require an even greater increase in net income in going from b to k to compensate them for a given fall in quality of life than they do in going from a to b. The trade-off between these variables is in general then not a constant one.

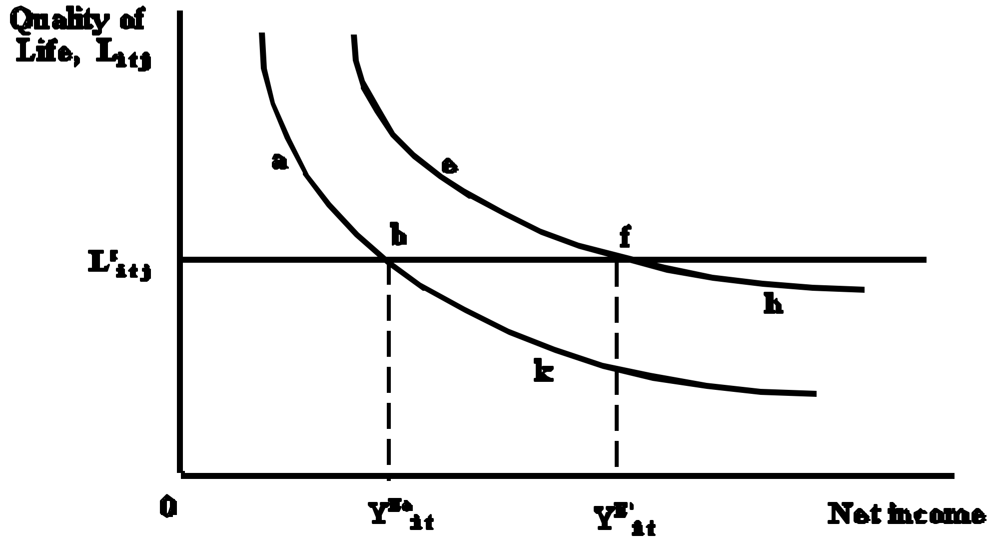

FIGURE 4.2

We may nevertheless derive a **monetary value to the overall benefit** which the individual receives from any given combination of net income and quality of life variables. We may do so through the concept of **equivalent net income**. This involves the level of net income which if received when the individual has quality of life variables at a specified **standard level** would make the individual indifferent between this given combination and the actual combination of net income and quality of life they will experience. Thus in Figure 4.2 the individual is indifferent between point k, involving the actual combination of net income and quality of life they will experience if they stay with their present career, and point b. Point b involves a quality of life at the specified standard level, L^s_{itj}, together with a level of net income level of Y^{Eo}_{it}. Y^{Eo}_{it} is therefore the equivalent net income which, when received together with a quality of life at the specified standard level, would make the individual indifferent between this combination and the actual combination of net income and quality of life which they experience in their present career at point k.

We can similarly derive **a monetary measure of the net gain** in benefit which the individual careers advisee receives as a result of a career move. A career move will in general result in a move to a different indifference curve at time t than the one on which they would have been had they not made a career move. The move from point k in Figure 4.2 to point h, for instance, involves an increase both in the individual's net income and their quality of life variable, placing them on a higher indifference curve than at point k. We may derive a monetary value to the overall benefit they receive from the move through the corresponding concept of the **equivalent gain in net income** which would bring about the same utility gain for the individual at the specified standard level of the quality of life variables as the career move does.

The derivation of this equivalent gain requires each individual career advisee to assess the importance to themselves of each of the non-income quality of life variables, such as those listed above. If the quality of life variable is below the standard specified level, as in Figure 4.2 for points k and h, such as because the career options involve little leisure time for them, they need to specify **how much income they would be prepared to give up to increase this quality of life variable to the standard level**. If the quality of life variable is below the standard specified level, as in Figure 4.2 for points a and e, such as because the career options involve considerable leisure time for them, they need to specify **how much additional income they would be require in order to be willing to reduce this quality of life variable to the standard level**. The calculation therefore involves similar considerations to those involved in the **Willingness to Pay** approach discussed above.

If we again set the standard level of the quality of life variable in Figure 4.2 at the level L^{s}_{itj}, the move from points b to f achieves the same increase in utility levels at this standard quality of life as does the career move from k to h. As above, the equivalent net income of point b in Figure 4.2 is Y^{Eo}_{it}, whereas the equivalent net income of point f is $Y^{E'}_{it}$ in Figure 4.2. The **gain in equivalent net income** levels between points b and f at this standard quality of life in Figure 4.2 is therefore given by $Y^{E'}_{it} - Y^{Eo}_{it}$.

When we insert this monetary value at time t of the career move into equation (4.10), we obtain a value for the resultant increase in human capital of:

$$\Delta H_i = \sum_{t=0}^{n} [Y^{E'}_{it} - Y^{Eo}_{it}]/(1 + r_i) \qquad (4.11)$$

where r_i is the individual's subjective rate of time preference, which we assume constant over time. The level of equivalent net income which results from a career move will depend upon the quality, Q_i , of the careers guidance offered to the individual, so that $Y^{E'}_{it}$ is a function of Q_i. Higher quality careers guidance should result in changes in net income and quality of life that in general raise the individual to a higher utility level, making $Y^{E'}_{it}$ in general **an increasing function of the quality of careers guidance given**, after any initial period of training or education has been completed.

Since quality of life considerations are directly involved in the determination of $Y^{E'}_{it}$, we may therefore extend our earlier equation (2.5) for the net benefit that results from careers guidance at the quality level Q_i **to include quality of life considerations**. This will involve the new evaluation equation:

$$NB_i(Q_i) = \Delta H_i(Q_i) - D_i(Q_i) - C_i(Q_i) = \sum_{t=0}^{n} \frac{Y^{E'}_{it}(Q_i) - Y^{E0}_{it}}{(1 + r_i)^t} - D_i(Q_i) - C_i(Q_i) \qquad (4.12)$$

where C_i (Q_i) is again the cost of providing the level of quality of careers guidance to individual i, and D_i (Q_i) is the extent of any subsidy element of the additional training or education which they undertake as a result of the careers guidance. An optimal level of careers guidance, Q^*_i , for the individual advisee may again be defined by the value of Q_i which maximises the net benefit, denoted by NB_i (Q_i), of the careers guidance in (4.12). This optimal level can be used as a **benchmark or standard** against which all guidance providers can be judged in assessing the **value for money** and **relative effectiveness** of their provision for any given individual advisee, compared to this optimal level of quality.

We may again include considerations of equity into the analysis by incorporating some degree of social **aversion to inequality in the distribution of monetary benefits**, including those adjusted for quality of life considerations. If we adopt a formulation similar to that of (4.8) above, we may also incorporate the considerations of diminishing marginal utility of income and risk aversion discussed in Section 3 above. This involves taking the logarithms of the corresponding levels of income, and weighting by a relative policy weight, w_1 , the cost, C_i , to the public sector of providing the careers guidance to individual i, and of any subsidy element, D_i , of the additional training or further education that is involved, i.e.

$$NB_i(Q_i) = \sum_{t=0}^{n} \frac{\log(Y_{it}^{E*}(Q_i)) - \log(Y_{it}^{Eo})}{(1+r_i)^{t}} - w_1 .\ D_i(Q_i) - w_1 .\ C_i(Q_i) \tag{4.13}$$

A higher relative policy weight, w_1 , on the costs to the public purse may itself a higher degree of tightness in the available budget for these activities. Where part or all of the cost of the career guidance falls on the individual advisee as a fee, this will reduce the level of net income of the individual advisee in (4.13) by the amount of the fee, so long as their demand for the careers guidance is not **price sensitive**. Only that part accruing to the public purse, or other sources of external finance, is then included within the computation of the cost C_i , net of fee income receipts.

We can then sum the resultant total value of net benefit to each individual i across all the individual career advisees, i.e.

$$NB(Q) = \sum_{i} NB_i(Q_i) \tag{4.14}$$

to yield the total net benefit generated by careers guidance at level Q = (Q_1 , ... ,Q_m) to each individual career advisee.

5. WIDER BENEFITS

There are a number of important wider social benefits which are likely to generated by high quality careers guidance, and which could be included in a cost-benefit analysis of such careers guidance. These wider social benefits are likely to include firstly:

5a. Increased Tax Yields to the Exchequer

When the existence of taxation is taken into account, the question arises as to how we should define the variable of **net income** which we have considered in previous sections as accruing to the individual under different career options. **If we ignore distributional considerations**, from the viewpoint of the cost-benefit analysis, we may include within the income variable the **gross income** earned by the individual during each period of time under the career option, **before tax**, before deducting job-related expenditures to arrive at the individual's net income. Whilst the income tax paid by the individual out of their gross income accrues to the Exchequer, distributional indifference requires that we pay attention to the **sum** of the income tax paid and the net income received by the individual after tax, i.e. the gross income of the individual.

However, it is likely that in making their own career decisions, individuals will pay attention to their own resultant **net income after tax**, rather than to their resultant income before tax. This itself will mean that **the social benefit** from individuals improving their life-time career earnings as a result of high quality careers guidance **exceeds the private benefit** to the individual career advisee, whenever they will pay increased income tax (and National Insurance contributions) as a result of a career move. The Exchequer here is essentially a **shareholder in the human capital** of the individual career advisee, who will benefit from its enhanced value. Such an enhanced value **extends the tax base** on which the Exchequer can draw to boost public finances.

If individual career advisees themselves have to **bear the full cost** of the careers guidance given, the level of investment which they undertake in improving their own human capital will tend to be **sub-optimal** from a social viewpoint. The cost-benefit analysis can then be linked to a case for an **optimal level of subsidy** to the careers guidance service and to the providers of additional training and further education to facilitate higher quality careers guidance and to encourage a more socially optimal level of investment in human capital.

When distributional indifference does not prevail, the relevant net income variables should be computed net of both job-related expenditures and **net of income tax**. However, an additional term is required to be added to the right-hand side of the computation of net social benefits from the careers guidance in equation (4.14) above equal to the total additional tax revenue generated as a result of the career moves made by careers advisees, weighted by the relative social weight upon income in the hands of the Exchequer rather than in the hands of individual taxpayers.

The wider social benefits resulting from beneficial career moves by individual career advisees will similarly include:

5b. Reductions in Unemployment and Other Social Security Costs to the Exchequer

These benefit payments will act like **negative tax payments**, boosting the net income after tax and benefit payments received by individuals who are unemployed or in low paid jobs. Securing a job, rather than being unemployed, or securing a better paid job, rather than a low paid job, through high quality careers guidance will reduce these costs to the Exchequer. Again, under distributional indifference, we may consider in the cost-benefit analysis simply **the sum of these cost savings plus the changes in the net income after tax and benefit payments of the individuals concerned**. This sum will again equal the change in the individual's **gross income** that results from the career move. However, **in the absence of distributional indifference**, we must evaluate **the net income of each individual under each career option, net of job-related expenditures and of tax and benefit payments** in the calculation of the net income variables Y_i in our above analysis. We must then deduct from the right-hand side of equation (4.14) **the increased tax yield plus saving in unemployment and other social security payments**, weighted by any relative social weight on income in the hands of the Exchequer, in order to derive the measure of net social benefit from the careers guidance.

The calculation of the benefits of increased tax yield plus saving in unemployment and other social security payments must take into account the potential **long-term nature** of the unemployment which the individual may otherwise experience in the absence of high quality careers guidance. In the presence of high rates of **technological change**, **cyclical down-turns**, and **demand and supply shocks** to the economy, such as from oil price increases, individuals may suffer a high risk of unemployment in their original occupation or location. In the absence of high quality careers guidance, there is a danger that **initial unemployment** will develop into **more permanent long-term unemployment**. The **value of their human capital** will then be substantially **damaged** by the loss of the **present value of the future earnings** they would otherwise have obtained if they had not become unemployed.

The result will be a form of **hysteresis**, in which a temporary shock to the economy results in permanent **long-term damage to human capital**. High quality careers guidance, combined with other measures, such as well-designed re-training programmes, can seek to avoid such long-term damage by increasing the **flexibility** with which individuals, and the labour market as a whole, can respond to technological change, cyclical down-turns and to supply and demand shocks. The calculation of the benefits of high quality careers guidance therefore needs to include the long-term **present value** of the increase in future net income which the individuals receive if the careers guidance enables them to avoid the risk of long-term unemployment, in a similar way to the calculations indicated in Section 2 above. In addition, if we calculate the individual earnings net of tax and benefit payments, the assessment of the benefits of high quality careers guidance must include **the long-term present value** of the increased tax yield plus saving in unemployment and other social security payments which results from avoiding long-term unemployment. High quality careers guidance can then be an important complement to government programmes, such as Welfare to Work and the New Deal for young unemployed people in the 18-24 age group (DfEE, 1999).

A further interesting direction in which there may be a wider social benefit from beneficial career moves from high quality careers guidance arises from:

5c. Reductions in Health Care Costs on the National Health Service

That there is a **socio-economic gradient of individual health status** across different geographical areas and occupations is well-documented (see e.g. Marmot and Mustard, 1994; Mayston 2000b). Encouraging individual career advisees to make career moves which boost their net income and quality of life may well result in an **improved health status** for the individual. This in turn may reduce their need for health care during their working life and early years of retirement. Moreover, quantitative estimates are available (e.g. Carr-Hill et al, 1994) of the extent to which particular variables, including job-related one such as unemployment, impact upon the need for additional health care expenditure. Reductions in local unemployment levels through the provision of high quality careers guidance would then have a quantifiable impact on the need for additional expenditure by the NHS. If the associated health care costs would have fallen on the National Health Service (NHS), they would have been a source of additional pressure upon public expenditure that is financed out of general taxation. The saving of this additional health care cost needs to be added to the additional tax revenue and benefits savings generated by the career moves which the careers guidance encourages.

We have discussed above the incorporation of the benefits to the individual themselves from improvements in the quality and length of life which result from a career move. If the career move **extends the length of life** of the individual, this may also in the long run increase the health care costs which fall upon the National Health Service. How far this is true depends upon the extent to which the individual is more likely to experience long periods of health deterioration that are expensive to treat close to the end of their life, as a result of the career move. A move from an occupation in which individuals tend to die early from incurable diseases to an occupation in which they live for many years, but then suffer several years of dementia, will yield changes in the quality and length of life for the individual themselves which may be evaluated using the concepts of Quality Adjusted Life Years discussed above. However, such a move may actually increase the health care costs that are in the long run imposed upon the NHS, although this increase may be more than offset by the additional tax payments which the individual makes over their extended life-time as a result of the career move.

Health care costs which fall upon the private health care sector represent a form of payment out of the net income of the individual, like their expenditure on other consumption items. Whilst account needs to be taken of the changes in the quality and length of life variables for the individual themselves that may be associated with these health care costs, they do not represent a form of additional public expenditure that must be offset against enhanced tax yields in the cost-benefit analysis.

5d. Reductions in the Frequency and Costs of Crime

One important role for high quality careers guidance is to enable individuals who would otherwise be unemployed to find new career opportunities. The statistical association between **unemployment and crime**, and the possible causal links between variables such as unemployment, substance abuse, and crime rates, suggests that a reduction in unemployment may assist in reducing crime rates. In a survey of empirical studies on unemployment and crime, Freeman (1999) found that there was much stronger support for the hypothesis that crime is linked closely to unemployment amongst data on individuals than from time-series analysis of trends over time, or in cross-section studies across different localities. The studies based upon data on individuals found that individuals who are prone to unemployment "are more likely to commit crimes and that people who commit crimes are more likely to do so during spells of unemployment".

A longitudinal study of 411 young men by Farrington et al (1986) found that the link between unemployment and crime was much greater amongst those with a history of **low status jobs**. Freeman (1999) also concludes that "the magnitude of the **worsened job market opportunities for less skilled young men** and rise in inequality" from 1973 onwards "were sufficiently large to suggest that they could have played a major role in the increase in criminal activity" (emphasis added). This is consistent with an economic model of participation in crime in which the expected payoff to crime, after taking account of the risks of detection and conviction and the likely penalties, is compared by potential participants with the other economic activities which they could engage in. If the latter employment opportunities are of low value, the tendency to crime will be greater for those individuals who are at the margin of such participation in crime. Careers guidance may then have a benefit in reducing the costs of crime if it reaches those individuals who might otherwise commit crime in the future, and for who are a stage in their life when greater prospects of employment and increased job-related skills may discourage them from embarking on criminal activity, or continuing with it as much as otherwise.

Coopers and Lybrand (1994) have estimated the marginal cost of an additional youth crime to be at least £2,300, of which **nearly half would be recoverable from the public purse** by less expenditure needed on the Criminal Justice System, and by local government and fire brigades responding to vandalism, criminal damage, fire damage and arson. Their cost estimate does not include any psychological benefits from reduced crime avoiding distress to victims or lessening the fear of crime amongst the elderly or others. Liddle (1998) carried out a more extensive analysis of the social costs imposed by a sample of offenders in the 15 - 17 population over their history of crime to date, in a study for the National Association for the Care and Rehabilitation of Offenders (NACRO), and found that the total cost per respondent of their crime history to date to average **£75,365 per respondent**. When extrapolated to the national population of approximately 2,500 offending individuals in this age group, the total cost of their crime to date totalled over £188 million.

Risk factors identified in these respondent case studies (Liddle, 1998) as contributing to the likelihood of a **history of crime** included **lack of skills and training**, drug and/or alcohol abuse, and unstable family living conditions. High quality careers guidance to individuals who might otherwise be unemployed or lack skills and training may then potentially reduce these risk factors, both for young initial offenders and for older adults, and their children. The high rate of **re-offending** of many of those who become caught up in the Criminal Justice System suggests that there are likely to be **long-term future costs of crime**, unless other more positive opportunities are available to the individual. High quality careers guidance may then yield large potential long-term cost savings, equal to the **present value of the savings in the costs of crime** which a **reduction in the risk factors** that are associated with participation in crime is likely to produce. However, this requires high quality careers guidance to be available to those at risk at points in their lives when they can make progress in escaping from the cumulative forces which may otherwise lead to a persistent history of crime. The extent to which careers guidance does succeed in these directions therefore needs to be carefully monitored, and combined with costings of the reduction in crime rates which this may generate.

5e. Macro-economic Benefits

High quality careers guidance, particularly to those who might otherwise be unemployed, is also likely to have substantial **macro-economic** benefits. These relate firstly to the concept of **mismatch** between **the demand for labour in different occupations and geographical areas and the available supply**. The level of mismatch within the British economy is considered by Layard, Nickell and Jackman (1991, p. 331) to explain at least a third of all unemployment in Britain. Mismatch is reflected in substantial variations in the ratio between local unemployment rates and local vacancy rates across different locations within the UK and across different occupational and industrial job classifications. High quality careers guidance, in conjunction with training and further education opportunities, can help to reduce this mismatch by making individuals who are unemployed in one particular geographic location, industry and/or occupation more aware of the increased employment opportunities which are available to them through geographical relocation and/or retraining.

High levels of mismatch will imply that in some local labour markets unemployment if high, whereas in others it is low. The **Phillips curve relationship** between unemployment and inflation means that low rates of unemployment will result in higher rates of inflation than do high rates of unemployment. This relationship is likely to **be non-linear**, with an increasing slope, of the additional inflation associated by subsequent equal reductions in the unemployment rate increasing as the unemployment rate approaches zero. In such a case, a high unemployment rate in one local labour market when combined with a low unemployment rate in another local labour market will result in a **higher overall level of inflation** than if the unemployment rate been equalised between the two labour markets.

If an individual who is unemployed in one location or occupation relocates or retrains so that they can now compete in another labour market where the unemployment rate is low, they will exert **competitive downward pressure** upon the rate of wage inflation in the second labour market even if they do not obtain a job in it for some time. If they do obtain a job, the level of vacancies in the second labour market will decline and the level of **excess demand**, due to demand exceeding supply, in this second labour market will be reduced, again easing inflationary wage pressures.

The effect of such a reduction in the level of mismatch between the demand for labour in different locations and jobs and the available supply is to **reduce the level of wage inflation** which is associated with any given average level of unemployment across the economy as a whole. If the Chancellor of the Exchequer, or the Monetary Policy Committee of the Bank of England, have a **target rate of inflation** for the economy as a whole, the economy can now be run at a **higher level of aggregate demand**, and a lower average rate of employment, than otherwise without raising interest rates or taxation to curb aggregate demand. The benefit of the reduction in mismatch which improved careers guidance and retraining opportunities achieve is **the increase in aggregate demand**, as measured by the GDP increase, which such a reduction makes possible.

The increase in GDP will include the additional net income which the previously unemployed individual receive as a result of their new employment, as well as that accruing to other individuals who find themselves with new job opportunities as the level of aggregate demand is expanded to a new higher level. The initial mismatch may, for instance, relate to a shortage of skilled labour. This shortage may be partially relieved by a previously unskilled worker undertaking training following careers guidance to become a skilled worker. The availability of another skilled worker may in turn, however, set up a need for another unskilled worker to service the skilled worker in the production process, so that there is some degree of **complementarity** in the demand for the two types of labour. The expansion of demand to relieve mismatch and increase production can then extend to the employment of both workers without inflationary consequences (see Johnson and Layard, 1986).

As we have noted above, high quality careers guidance may help individuals who are initially unemployed from becoming long-term unemployed. If the number of months and years in which the individual is unemployed increase, both skills and motivation may decline, so that permanent damage to their human capital results. The **hysteresis** which is associated with the **long-term damage resulting from initial increases in unemployment** will not only **impair the value of the individual's human capital**. It will also result in an **increased pool of long-term unemployed** who offer little effective **competition in the labour market** to constrain inflationary pressure at any given level of aggregate demand, and who have effectively withdraw from the mainstream labour market as a source of labour supply. The benefit from high quality careers guidance which reduces the number of individuals who become long-term unemployed will then itself be a long-term one, requiring calculation of the **present value of the future stream of increases in aggregate demand** and GDP which are feasible at any given target rate of inflation if the long-term unemployment rate is thereby reduced.

High quality careers guidance can assist not only in informing individuals of job and training opportunities outside their present location and industry. It can also help individuals to **form more realistic expectations** of their likely income if they pursue different courses of action. The use of **search theory** in labour economics (see Pissarides, 1985; Mortensen, 1986) has stressed the importance of an individual's **reservation wage.** This is defined as the wage at which they are just willing to take a job in any given period of job search. If the individual has an excessively high expectation of the wage they can ultimately command if the keep searching for a longer period of time, their reservation wage in any given shorter period of time will tend to be excessively high. As a result, they will refuse jobs offering a lower wage than this excessively high reservation wage, and therefore be unemployed for longer than if they had formed more realistic wage expectations. The level of **transitional unemployment** will therefore be increased, if individuals, because of inadequate careers guidance, take longer in their search for new employment. However, there may not only be a loss of net income, and higher social security cost, in the period for which they have the initial high reservation wage. As the duration of their unemployment increases, their skills and motivation may decline, thereby reducing also their longer term prospects and earnings. The level of more **permanent long-term unemployment** may also increase, if the wage expectations which individuals form in the absence of high quality careers guidance do not adapt sufficiently to the prevailing labour market conditions.

5f. Net Social Benefits

We can draw the above strands together into an overall computation of the net social benefits that result from different levels of quality of careers guidance. We will denote by $NB_i^o\,(Q_i)$ the value of the net benefit to individual i of the enhanced value of their human capital which results from receiving careers guidance at quality level Q_i , adjusted for quality of life considerations, as in equation (4.13) above, but making use of the variable of individual income computed **net of tax** payments and the receipt of any social security payments by the individual. Corresponding to (4.14), we have the total net benefit, before taking into account the wider social benefits, to be given by:

$$NB^{o}(Q) = \sum_{i} NB_{i}^{o}(Q_{i}) \tag{5.1}$$

where the summation takes place over all career advisees of a given guidance provider, or within a given geographical area, such as a region, if this is our focus of attention.

In order to compute the overall Net Social Benefit, NB(Q), within a **social cost-benefit analysis**, we need to add to (5.1) the **tax yield** to the Exchequer, T(Q), that results from the changes in **before-tax income** that the careers guidance of quality Q generates. In addition we need to add to (5.1) the savings in social security benefits, S(Q), and any reductions, H(Q), in health care expenditures on the NHS that result from the career improvements that are associated with this level of quality of careers guidance. Since the tax yield and savings in social security and health care costs accrue here to the public purse, we will weight them by the relative policy weight, w_1 , on financial costs and benefits to the public purse compared to money income in the hands of private individuals. Because much of the cost of crime also falls on the public purse, we will similarly include within such relative weighting any reduction, M(Q), in the cost of crime which results from the improved career prospects which the careers guidance achieves.

We have also discussed above the possibility that high quality careers guidance may help to reduce the degree of **mismatch** in the labour market between the demands for particular skills in particular parts of the country and the available labour supply. This in turn may enable the economy to be run at a higher level of aggregate demand, that is still consistent with any given level of the inflation target for the economy at large. The additional demand for labour, and available supply, that is generated by this higher level of aggregate demand may include not only the labour that is newly-trained or newly re-located as a result of the careers guidance. It may also include labour in other occupations and locations whose demand is complementary to the newly-trained or newly-relocated labour. Easing a bottleneck of skilled workers through encouraging re-training may then result in more unskilled workers also being employed to work alongside the additional skilled workers on the production line. As a result, the net income of the unskilled workers may also rise, as also may their quality of life from non-income variables.

If there are macro-economic external effects on the net income and/or quality of life of other workers, these should also be included in the calculation within the social cost-benefit analysis. This will involve an additional term, which we will denote by NB' (Q), computed in a similar way to (5.1) but summed over all individuals who are not directly in receipt of careers guidance, but whose net income and/or quality of life changes because of the reduction in mismatch that the careers guidance achieves when provided at a given level of quality, Q.

The improved employment opportunities of these secondary workers will also in general result in increases in the tax yield from the higher pre-tax incomes which these improved employment opportunities generate. The value of T(Q) used in the social cost-benefit analysis should therefore include the additional tax yield generated by the improved employment opportunities to these secondary workers. Similar remarks apply to the savings in social security costs, S(Q), in health care costs, H(Q), and in the costs of crime, M(Q).

The overall total for the net social benefit from the careers guidance in the social cost-benefit analysis therefore equals:

$$NSB(Q) = NB^o(Q) + NB'(Q) + w_1 \, . \, [T(Q) + S(Q) + H(Q) + M(Q)] \qquad (5.2)$$

A level of **optimal social quality of careers guidance** can be defined as that level, Q**, which maximises the value of NSB(Q). When we take into account the definition of net individual benefit in (4.13) above, this will be achieved when the **marginal increase in the value of human capital** which higher quality of careers guidance achieves is equated to the **net marginal social cost**, weighted by the policy weight w_1 placed upon net public expenditure.

The net marginal social cost equals the additional cost to the public purse of providing the higher quality careers guidance, and any associated subsidy element to the additional training and/or further education involved, less the monetary value of the additional tax yield and savings in social security benefits and health care expenditures and costs of crime which result from the higher quality careers guidance. These financial offsets may reduce the net social cost of providing the higher quality careers guidance to a low level. The net social cost may indeed become negative as a result of these financial offsets if the higher quality careers guidance results in large savings in social security payments because individuals who would otherwise have been unemployed now become employed.

The computation of the increase in human capital is carried out here using net income projections for the individual, net of income tax and social security payments. Improvements in the quality of the careers guidance which result in large social security payment savings may then still be justified even though they may not substantially increase the individual advisee's income, net of tax and social security benefits. This highlights the potentially large diverge which may exist in some cases between the social benefits of careers guidance and the private benefits to the individual careers advisee, and underlines the scope for assessing the detailed case for external financial support for careers guidance services of different levels of quality in order to achieve these wider social benefits.

6. CONCLUSIONS

We have developed a framework for the analysis of the monetary benefits from different levels of quality of careers guidance, and associated careers guidance interview, based upon **the value added** which it achieves in the value of human capital of individual careers advisees. We have also extended this framework to include the analysis of the extent to which careers guidance improves the career choices of individual advisees under conditions of **uncertainty**. The benefits from such careers guidance, and increases in its **quality**, flow from the reduction in both Type I errors, of individuals failing to chose career moves which would be optimal for them, and the Type II errors which result if individuals make career moves that makes them worse off than making no career move. Perfect careers guidance will result in a zero frequency of such errors. The frequency and magnitude of these errors is an indication of the extent to which the quality of the careers guidance offered by a given provider diverges from the **benchmark** of perfect careers guidance.

We have also extended our analysis to take into account the **quality of life improvements** resulting from the careers guidance, and examined how to place a monetary value on these that take account of the preferences of the individual careers advisee. In addition, we have analysed several sources of wider **social benefits** which should be included within the **social cost-benefit analysis** of higher quality careers guidance.

The analytical framework can be used as the basis for the specification of the associated **informational requirements** to formulate detailed quantitative estimates of the associated costs and benefits. This in turn can support the development of a **well-designed database** on client characteristics, local economic and other environmental variables, and the improvements in the net income and quality of life which result from the careers guidance provided by different individual providers. The above focus on the frequency and magnitude of Type I and Type II errors as indicators of the scope for **beneficially improving the quality** of existing careers guidance provision can itself, for instance, be related to **quality of service indicators**, such as the degree of **access** to the careers guidance which is available to potential client groups who could benefit from high quality careers guidance by reducing the extent of Type I and Type II errors in their existing career choices, and of the **quality of information** which is available to them.

The development of a well-designed database based upon such analytical foundations can assist careers guidance providers in identifying beneficial career moves for individual advisees. In addition, it can generate well-designed **performance indicators** which demonstrate the **scope for further progress** in improving the quality of careers guidance provision, and the **quantitative benefits** of this improvement in quality. The conceptual framework theory we have developed can be linked to analytical techniques, such as Data Envelopment Analysis (see Mayston and Jesson, 1988) and Stochastic Frontier Analysis (see Mayston and Jesson, 1999), which can identify current **best practice** providers of careers guidance, taking into account the nature of the client groups which they serve. In addition, they can be used to assess the **relative effectiveness** and **value for money** of other existing providers and the **quantitative scope** that exists for securing benefits from improving the quality of their provision. The identification of best practice can itself be used to define **standards of delivery** and **targets** for service delivery and the quantitative benefits associated with these targets.

The above framework theory can also be used to support the detailed appraisal of the case for different levels of **financial support** for individual careers guidance providers, and for the system as a whole, to achieve different possible standards of careers guidance quality. In addition, it can assist in the appraisal of the **optimal level of fees** to careers guidance advisees, once we relax our earlier assumption that such potential advisees are price insensitive, in their demand for careers guidance, to the levels of fees charged.

Reaping the potential benefits of high quality careers guidance, through reducing the frequency and magnitude of Type I and Type II errors by individuals in their career choices, can itself contribute directly to the Government's own **central policy aim** in the field of education and employment, namely "to give everyone the chance, through education, training and work, to realise their full potential, and thus build an inclusive and fair society and a competitive economy" (DfEE, 1999). Building upon the analytical foundations we have developed, in the directions indicated above, is therefore an important next step towards the achievement of this goal.

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